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## GYNÆCOLOGY





# GYNÆCOLOGY

*A TEXT-BOOK FOR STUDENTS AND A  
GUIDE FOR PRACTITIONERS*

BY

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## P R E F A C E

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IN writing this book I have tried to limit myself to those subjects which are strictly gynæcological and upon which a professor of gynæcology usually has to lecture. It appeared useless to describe fully the very rare diseases, those which even one with a large clinic seldom sees, and to picture, either in text or illustration, operations now generally abandoned. To do so would be to make the work too encyclopædic. The bibliography so often found in gynæcological works would be out of place in a work intended for the student and general practitioner; and it is not the province of a gynæcologist to illustrate the findings of the microscopist or of the anatomist. A text-book on diseases peculiar to women should describe those diseases and their treatment as fully as possible, and such a book I have tried to write. I have at the same time so treated the subjects that the work may interest even those of large experience.

The work has been divided into two parts: in the first, the diseases are described, and in the latter the operations are given. This arrangement, I have thought, will admit of more unbroken and symmetrical reading. It will also enable the practical surgeon to find what he wishes without going over unnecessary matter.

The author has become convinced that works on gynæcology are made too general and discuss subjects which properly belong to and are better treated of in other departments, notably surgery and pathology. It has seemed to him that but a few pages of the modern works upon gynæcology are devoted to a description of diseases peculiar to women—those upon which a professor of gynæcology in any of the colleges has to lecture. Therefore, a student or practitioner, reading one of the modern books upon gynæcology, will become impressed with the fact that there is much overlapping, and that he will have presented for his consideration as

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gynæcological, matters which strictly belong to other branches of medicine.

By confining himself strictly to gynæcological topics the author has sufficient space to devote to those subjects which are solely within his province.

Most of the illustrations are original and have been made by eminent artists, and those which have been borrowed are of equally high grade.

The work is chiefly notable for the absence of bacteriology and minute anatomy, and to the prominence given to non-operative as well as operative treatment.

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# GYNÆCOLOGY

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## CHAPTER I

### EXAMINATION OF THE PATIENT

**Taking the History.**—The physician draws his conclusions from facts elicited by questioning the patient and from examination. Even an ignorant person when carefully questioned will furnish most important evidence. All questions should be asked in a matter-of-fact and not too interested manner, for ill women are apt to be nervous women, and these are often eager to meet all leading questions more than half way. A clear history will frequently be the determining factor in making a diagnosis. Too much stress cannot be laid upon the proper taking of histories and their preservation. The history should first proceed with a general statement regarding the patient. Then the functions of the several special organs are described, after which the results of examination are put down.

**Examination of the Abdomen.**—This may be made in bed, but is preferably done on a table sufficiently long to hold the supine body. The movements of the organs should be unhampered by tight clothing. The patient should be clothed in her night-gown, and when on the table should be covered by a sheet. The gown is lifted to the breast-line, and the limbs to the pubis are covered by the sheet. The patient should lie perfectly relaxed and breathe naturally. Upon *inspection* we note: the appearance of the skin and cutaneous vessels; whether the belly sags laterally or is rounded; whether it is symmetrical or distorted by intra-abdominal growths; the mobility of the abdominal wall over stationary tumours in the abdomen, or the movement of movable tumours with respiration. It will also be noted whether the abdomen is rigid.



- Date of Consultation. Name.
- Age. Residence. M. S. Wd.
- How long?
- Infantile Diseases. (*Nature and dates.*)
- Family History. (*Giving ages at death and causes, of two generations. Has a bearing on vitality.*)
- Age of Maturity. Regularity of Menses. (*State all variations up to present time.*)
- Pain. (*During menstruation from maturity to present time.*)
- Character of Flow. (*Whether clotted, consistence, amount.*)
- Duration. (*From first appearance to complete cessation.*)
- Leucorrhœa. (*Amount of douching necessary to keep clean, colour, occurrence, variability. Very important in inflammatory and malignant cases.*)
- Children. (*Number, ages.*)
- Character of Labours. (*Whether instrumental, presentations, fever after.*)
- Miscarriages. (*Dates and periods of gestation, causes, fever after.*)
- Previous Treatment. (*By whom and nature of, particularly operations.*)
- Bowels. (*Regularity, pain, hæmorrhoids, bleeding.*)
- Bladder. (*Frequency, pain, continence, number of times patient rises at night.*)
- History of Present Illness. (*Date of onset, symptoms, paying particular attention to functions of the special organs.*)
- Urinalysis. (*Always chemical and microscopic, bacteriological if pus be present.*)
- Appearance of Patient.
- Examination { *heart*  
*lungs*  
*special organs*  
*state of abdominal viscera*  
*date*

*Palpation* should proceed methodically and in such a way as not to alarm or excite the patient. By superficial palpation growths just beneath the surface may be felt, the general or local rigidity of the abdomen appreciated, and the integrity of the abdominal parietes determined. The tactile surfaces of the fingers should be employed and not the ends of the fingers. In deep palpation it is sometimes well to use one hand for feeling only, the fingers being held together and pressed down by the other hand. In palpating a sensitive spot the pressure should not be released suddenly, as this may hurt and startle the patient. Fluid masses are appreciated by laying one palm on the side of the abdomen and tapping the other side with the other hand. In obese patients the semi-fluid fat will also give out a thrill, but this can be eliminated by the pressure of the edge of an assistant's hand in the median line.

In palpating the appendix the hand is laid on the McBurney line near the linea alba and pressed deeply into the abdomen. It is then drawn slowly towards the anterior superior spine. As it passes over the caecal region the appendix, if diseased, may be felt, or pain elicited. An enlarged uterus is best mapped out by pressing the fingers deeply into the pelvis above and behind the uterus, and then by a lateral motion determining the contour of the organ. The inguinal glands should always be palpated. In examining the kidney I prefer to turn the patient on her side with the proximal knee drawn up, thus obtaining complete relaxation of the area to be examined. Then one hand is placed over the anterior face of the kidney and the other hand behind over the three last ribs. Between the two hands the kidney may be felt. The free border of the liver and gall bladder should be palpated. THE EXAMINER MUST ALWAYS REMEMBER THAT A DISPLACED ORGAN AND ONE THE SEAT OF NEOPLASM NATURALLY MOVES MOST READILY TOWARDS THE NORMAL POSITION OF THE ORGAN. For instance, the movable kidney is displaceable upward, or ovarian cyst downward, etc. *Percussion* will give valuable information in many cases. It will show the change in position or fixity of an intestinal note when the body is rolled from side to side; the range of mobility in the flat note of a tumour; the size of a dilated stomach or colon: the presence of an omental tumour; the tympanitic note over the liver in rupture of the intestine; and the note given out by the contents of hernial sacs. *Auscultation* by the stethoscope will show the friction sound

of an ascending peritonitis, whether due to perforation of a typhoid ulcer or puerperal septicæmia. It is of great value in the latter condition, showing the first onset of diaphragmatic peritonitis. By it we may also hear the bruit in the larger fibroid tumours and pregnant uterus, as well as the gurgle of gases in the small intestines.

When the patient is thrown into the Trendelenburg (Fig. 6) position gravity draws the intestines out of the pelvis, so that the suprapubic field sinks in. This will tend to bring more prominently into view pelvic tumours if not adherent deep in the pelvis, and will cause movable kidneys and enlarged gall-bladders to sink under the protection of the ribs. Consequently this position is sometimes employed for the purpose of facilitating palpation of the

lower abdomen in obscure cases, but it is exceedingly uncomfortable to the patient.

The *dorsal* position enables us to make a thorough examination of the genitals. The patient lies on her back with loose clothing (Fig. 1). The hips are drawn well down on the table, so that the feet rest at its edge. The physician should see that the patient is properly covered by a sheet. If the vulva is very sensitive it should be dried off and a piece of cot-



FIG. 1.—THE DORSAL POSITION.

ton soaking wet in 5-per-cent cocaine solution should be introduced just within the fourchette and left there ten minutes before the examination is made.

**Pelvic Examination.**—It is to be noted whether the nymphæ fall together and close the *introitus vaginae* or whether the vagina is gaping. Symmetry or distortion is also to be observed.

The condition of the anal orifice is seen. Upon gently opening the vulva the nymphæ, clitoris, urethra, the vulvo-vaginal ducts, Skene's tubes, and the perinaeum are inspected. The colour, size, and shape of these organs must be noted, together with any discharges present.

*Combined Method* (Fig. 2).—Having thoroughly cleansed his hands and lubricated the left index finger, the physician stands to the woman's left and introduces his finger into the vagina. The left hand is chosen for this part of the examination if the physician be right-handed, and for several reasons. The left hand is the smaller, it is more flexible, the tactile sensation is greater, and the examining hand should never be the one which must also hold instruments. The *tactus eruditus* is better taught the left hand, the right hand being reserved for manipulation of instruments. The examiner should stand at the side of the

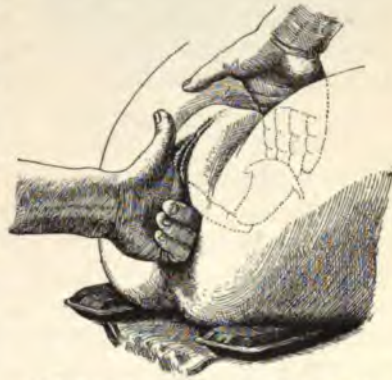


FIG. 2.—THE COMBINED OR BIMANUAL METHOD OF EXAMINATION.

pelvis and should never insert but one finger into the vagina. It is improper to stand in front of the woman, because extreme outward rotation of the hand is then impossible and the right side of the pelvis cannot be properly palpated. The finger notes the condition of the vagina and cervix uteri. The right hand is laid with the four fingers touching and the hand open above the pubis, and a gentle, steady downward pressure is made. Between the two hands thus placed the uterus and its adnexa can be palpated. The abdominal hand feels little, it merely steadies and depresses the organs. Poking the abdomen with the fingers will either cause pain and muscular contraction or will tickle the patient, all of which are undesirable and embarrassing. The examiner should note the height of the cervix; its position between sacrum and pubis; the direction of its canal, whether looking in the axis of the vagina or normally backward; the size and form of the cervical lips, whether smooth, rough, irregular, torn, or enlarged, and whether the cervical canal is closed or open. In searching for the body of the uterus always first feel for it where it should be. Pass the examining finger anterior to the cervix and as high as possible along its anterior face. The rounded body of the uterus may be felt, and by a bilateral sweep of the finger the contour of the anterior face of the corpus uteri

will be made out. The abdominal hand pressing downward and the vaginal finger passed beneath the cervix, the entire uterus may be palpated between the two hands. Still steadying the organ with the right hand, the vaginal finger is passed to one side and close to the cervix as high as it will reach. In doing so the consistence of the broad ligament will be noted. Then swinging the finger outward, the hard, often nodular ovary may be felt, easily slipping away from pressure. The normal Fallopian tube cannot be felt. If a mass is felt on one side, the vaginal finger determines whether it is sessile upon the uterus or whether there is a distinct sulcus between the mass and the side of the uterus. Passing the finger posterior to the cervix, it is made to palpate the posterior surface of the uterus as high as it will reach and detect any growth upon that surface or mass in Douglas's *cul-de-sac*. If the woman be very fleshy or the vagina deep or the abdominal muscles held rigid, the knees may be lifted up into the *lithotomy posture* (see Fig. 2).

This causes the abdominal muscles to relax and stretches the tissues over the vulva so as to thin them out. The examiner may displace the pelvic floor upward for 2 inches by standing in front of the patient, and, bracing his elbow against his hip, crowd his hand hard against the vulva. The fingers of the examining hand are also displaced into the palm, thus artificially lengthening the index finger. In spare women, instead of folding the fingers into the palm they may be held straight and passed behind the coccyx. As the finger is withdrawn it is to be noted whether it is blood-stained or covered by discharge. The colour of the latter is significant; and that the examiner may not be deceived in this, he should employ as a lubricant either boroglyceride or white vaseline, or even soap.

*Sims's position* (Fig. 3) is employed not so much for unassisted inspection and palpation as for the convenient use of certain instruments of examination. It is best secured by the use of a special table; but most houses contain a stout table for the patient's body and a lighter one for her legs, which will suffice. As the object of the posture is to secure the benefits of gravitation of the viscera from the pelvis, the waist clothing must be loose. Certain essential points may be stated to emphasize the illustration: the left trochanter must be at the table's edge; the thighs drawn nearly at right angles to the body, the right being higher than the left; the right leg lies in front of the left; the left arm is

vagina. Gentleness must be used, and when the speculum has passed the fourchette 2 inches, it is turned so that one blade is posterior, the other anterior. The blades are then separated and the cervix brought into view. Through this speculum applications to the cervix may be made, cervical cysts punctured, secretions secured, and bloodletting from the cervix done; BUT NO PLASTIC OPERATIONS SHOULD BE ATTEMPTED. If Sims's speculum is used to depress the posterior wall, the anterior must be held up by some form of elevator in nulliparæ, not always in multiparæ. The speculum examination of the vagina in the dorsal position necessitates opening the vagina against the intra-abdominal pressure, therefore *Sims's position* is always preferable. This necessitates the assistance of an attendant to hold the speculum. A long speculum is selected, one wide enough to prevent the posterior vaginal wall folding over it. The assistant with his left hand lifts the woman's right buttock and right labium. The operator pulls down the left labium and inserts the speculum gently in the axis of the vagina. No force must be used lest the vaginal membrane be lacerated. The assistant now grasps the bar of the speculum and draws back the perinæum. As he does this the atmospheric pressure is released and air enters the vagina, ballooning it out. A depressor or forceps holding a swab may be used to still further push away the anterior wall, when the cervix will come into view. All plastic operations may be done upon the cervix; all operations upon the vesico-vaginal sæptum and urethra, as well as the *cul-de-sac* operations, are easily performed in this position. In operating upon the uterus it is advisable to use the short Sims's speculum to expose the uterus, as with it the uterus can be pulled down. This position is the one to be selected in the after-treatment of all cases of vaginal hysterectomy and incision, for it is the one which takes advantage of natural forces to assist in opening the field to be inspected and minimizes the intra-abdominal pressure. Or the perinæum may be retracted by a Jackson speculum with the patient in the lithotomy position, and the plastic operations upon the uterus, partial and complete hysterectomy, removal of ovarian cysts, and, in fact, all operations upon the pelvic organs which are appropriately performed through the vagina, may be done in this position when the perinæum is retracted by so simple and mobile a speculum as Jackson's held by a competent assistant.

The *combined method* of examination, or vagina-abdominal, is little aided by instrumentation. But sometimes it is necessary to hook a pair of blunt bullet forceps into the anterior lip of the cervix so as to draw the uterus down, thus enabling the operator to more readily map out the organ and its attachments. It will be seen that this procedure finds its chief application in the manual replacement of the retroverted uterus (Brandt's method).

With the *author's position* instruments are of the utmost aid. After the posterior *cul-de-sac* is opened, a posterior retractor holding down the vaginal wall and the trowel lifting the uterus, the operator is enabled to view all the pelvic contents. After the completion of a vaginal ablation, by holding aside the stumps with Péan's lateral blades, the whole field of operation can be inspected. THIS POSITION OPENS UP TO EXPLORATORY AND CONSERVATIVE WORK THROUGH THE VAGINA A CLASS OF CASES NOT THUS ATTEMPTED BEFORE ITS DISCOVERY.

Second only to this is its value as a means of direct inspection and treatment of the diseased female bladder and ureters. The use of the various instruments will be better illustrated under the headings of the several operations.

The *knee-chest* position, for reasons stated, is undesirable, and its value when the examination is assisted by instruments is much overestimated. By some it is thought that the position is particularly useful in replacing a retroverted uterus. The opposite is the fact. The speculum, preferably a Sims's, is introduced into the vagina after the patient has been placed in this position and the perinaeum is raised. The fingers may be used for the same purpose. At once the air rushes into the vagina, the viscera leave the pelvis as far as their attachments will permit, and the cervix uteri recedes from the touch. The body of a retroverted uterus, if movable, can no longer be felt and the displacement seems to be overcome. Such is not the case. The posterior vaginal wall has sought the sacral curve and the anterior approaches the posterior aspect of the pubis. The result of assuming this position and opening the vagina is to cause the retroverted uterus to become more retroverted, the anteverted uterus slightly less so, and the uterus as a whole to move farther away from the pelvic outlet. The position is useful to assist in the replacement of the gravid, retroverted uterus and for the purpose of giving high enemata.

By it also ovarian and broad-ligament congestions are relieved. If the patient suddenly turns on her back from this position an embarrassing noise may be made by air escaping from the vagina.

Sensitive and prolapsed but movable ovaries may also be made to assume a higher plane by this position.

The instrumental examination of the bladder will be described in a separate article.



## CHAPTER II

### *THE INFLAMMATIONS*

#### **VULVITIS**

THERE are three chief varieties: the simple, the follicular, the gonorrhœal.

**Simple vulvitis** is seen in adults as the result of lack of cleanliness, the germs of putrefaction, the colon bacillus, and the skin cocci being present. It may occur as a primary affection or be caused by the escape of irritating discharges coming from above. It must not be confounded with the redness and swelling due to the trauma of riding, bicycling, etc. There is redness, slight swelling of the nymphæ, increase in the mucous discharges from the parts, and muco-pus. The tubular-gland orifices appear as small red dots. There is often itching, a sense of heaviness about the parts, and scalding during urination. The disease is not common in adults, but often seen in children, between whom it is easily communicable.

**Follicular vulvitis** is more often seen as the result of lack of cleanliness in women who have diabetes and ammoniacal urine. The sebaceous glands become inflamed and discharge pus; or, their mouths being blocked, they produce acne-like pustules. Or the muco-cutaneous surfaces of the vulva may be bathed in an ill-smelling pus. The symptoms are the same as those of simple vulvitis, but as this form is seen in older women, as a rule we find them less attentive to the annoying symptoms than are the younger with simple vulvitis. The presence of this form of vulvitis always calls for an analysis of the urine.

The disease is not seen in children.

**Gonorrhœal Vulvitis.**—This is by far the most common form. The urethra is puffy and red, and upon pressure exudes pus. The

prepuce of the clitoris is œdematous and the clitoris semi-erect, owing to engorgement of its erectile tissue. The tubules of Skene appear as red spots, as do the orifices of the single follicles. In places the tissues have lost their epithelial covering, but deep ulceration does not occur. The ducts of the glands of Bartholin are pouting and discharge pus. The glands themselves, one or both, may be involved, causing a swelling upon each side which is exquisitely sensitive. The tissues are always bathed in pus in the acute stage, and in the chronic some inflamed gland-mouths may be seen. The microscope always shows the gonococcus; but in old cases pressure upon the labia may be necessary to make the glands discharge their infected contents.

The diagnosis of the several forms depends upon the above symptoms, often supplemented by the microscope. Where vulvitis occurs in hospital wards, particularly among children, the utmost caution must be exercised to prevent its spread. In children, inguinal adenitis is a common result of the gonorrhœal form.

The *treatment* of all forms of vulvitis must be actively pushed. Frequent bathing with saturated solution of boric acid will usually suffice to cure the *simple* form. The parts should be kept dusted with boric powder. In the *gonorrhœal* form in children the same wash should be used, assisted by the daily application of nitrate of silver 1 or 2 grains to the ounce of water. If inguinal adenitis supervenes, it is best treated by unguentum Credé or ichthyol ointment 10 per cent. Gonorrhœal vulvitis in adults demands more heroic measures, and is more difficult to cure. In view of the destructive lesions produced by it if it extends higher, these cases should be kept in bed. If the vulval hair is long it should be shaved off, as it conduces to reinfection. Two methods of treatment are used by me. The vulva may be thoroughly scrubbed with solution of lysol, 1 per cent, then with bichloride of mercury (1 to 5,000), afterward using twice a day vulval washings of the latter solution. This treatment I apply to hospital cases.

Or, as in office treatment, the vulva is dried off and then carefully moistened with nitrate-of-silver solution, 5 per cent, or protargol, 10 per cent. Each day until a cure is effected the vulva is painted with either 2-per-cent nitrate of silver or protargol, 5 per cent. The patient is made to wash the vulva once every eight hours with bichloride-of-mercury solution (1 to 10,000), using cotton or gauze as a sponge.

**BARTHOLINITIS**

Bartholinitis (Fig. 7), or inflammation of the vulvo-vaginal gland, produces swelling in the gland, which becomes hard and sensitive. In my experience it is invariably of gonorrhœal origin, these glands having a particular resistant power against other



FIG. 7. —ABSCESS OF LEFT VULVO-VAGINAL GLAND (Kelly).

The distention is in the direction of least resistance, out from the left pubic ramus, partly covering the vaginal outlet.

pyogenic organisms. The duct of the gland is reddened and pus can be squeezed from it if acutely inflamed; if in a chronic state there may be no appreciable fluid. If the duct alone is involved it should be treated by nitrate of silver, 5 grains to the ounce, applied on a filiform probe. If the gland is involved and dis-

charging through the duct it should be cocainized and slit open, iodoform-gauze dressings being applied afterward several times a day to the open wound. If the suppuration be old the entire gland should be removed under ether. An incision is made external to the vaginal orifice, parallel with it, and over the gland for an inch. The gland is carefully dissected out of its bed so as to form a pedicle at the upper portion where the nutrient artery enters. This is ligated. The wound is to be treated open by iodoform-gauze dressings, if pus be present.

Too much stress cannot be laid upon the importance of radically curing every case of gonorrhœal vulvitis, and proving the cure by bacteriological examination of the discharges secured by pressing the tissues, for the germs may lie deep in the glands. Chronic latent gonorrhœal infection of the vulvo-vaginal glands causes much of the spread of this disease. And it is always a possible means of acutely reinfecting the woman.

One of the most disagreeable symptoms of which women with simple or follicular vulvitis complain is *pruritus*. In fact, it is often the only symptom which elderly women have. Its presence always arouses a suspicion of diabetes. I have secured the best results by applying between the labia and nymphæ a bit of cotton moistened in  $\frac{1}{2}$  per cent of lysol. An ichthyol ointment of 5-per-cent strength in lanolin is also effective. In children with vulvitis, and who scratch the vulva, worms or irritating clothes may be suspected as the cause.

### VAGINITIS

Vaginitis may occur at any age. It is induced by worms, masturbation, the flowing down of putrid discharges, as in cancer, and by the introduction of the various pathogenic germs. The vagina being but an inverted tube of skin with very few if any glands and covered by many layers of squamous epithelium, it is particularly resistant against germ invasion. At first the membrane becomes dry and red and swollen, with elevation of the papillæ. After a time a watery discharge follows, which soon becomes purulent and accompanied by exfoliation of the epithelium. Such are the lesions in both the simple vaginitis and the gonorrhœal. If the inflammation is more intense the elevation of the papillæ may be so marked as to warrant the name of *granular vaginitis*. If there is a general

exfoliation of the epithelium the raw surfaces may unite, and this form is called *adhesive*. Another form is the *emphysematous*, characterized by the presence of gas-producing bacilli under the epithelium causing gas blisters.

Vaginitis is not as common as once thought, the membrane being able to resist the presence of even large quantities of gonorrhœal pus. In all cases of gonorrhœa it is a complication in about 15 per cent. The gonorrhœal type is seen most often in young women, the other forms in middle life. But there are no clean-cut differentiations possible without the use of the microscope. The *symptoms* are heat, itching, ardor urinæ, dysuria, burning, sense of weight, nervousness, and local soreness. The vagina is swollen, and there are commonly present the signs of vulvitis. There is profuse yellowish or greenish discharge. If gonorrhœa be the cause, urethritis is always present.

*Treatment of Gonorrhœal Vaginitis.*—The patient should go to bed. Place her in Sims's position and retract the perinæum. Dry the entire vagina carefully and paint it with nitrate of silver, 10 grains to the ounce in the young, and 20 grains to the ounce in older women. The vagina is then packed full of iodoform gauze, 10-per-cent strength, which has been wrung out in bichloride solution (1 to 5,000). The dressing is left in two days and is then removed, the patient receiving afterward bichloride douches twice a day (1 to 5,000). Or, the only treatment may be one of douches, though these do not have the speedy action nor prevent extension upward to the uterus which the packing method has. Astringents should never be used in the acute cases. In chronic cases sulphocarbolate of zinc (5 to 10 grains to the ounce) may be used as a wash, or iodoform-gauze packing.

The complications to guard against are endometritis, proctitis, and cystitis, therefore no instruments should be passed into either the uterus, rectum, or bladder during an attack.

In the form of vaginitis known as *senile*, seen in old women and in the young who have been castrated, the preferable application is some pure grease, as lanolin or sweet-oil. Gas and fluid accumulations beneath the epithelium must be evacuated before treatment is begun.

The *simple* form is best treated by 4-per-cent boric-acid douches every six hours.



**INFLAMMATION OF THE CERVIX UTERI**

The cervix being lined with a true mucous membrane supplied with compound racemose glands, it is not often the seat of those changes which we call hæmatogenous, but most forms of inflamma-



FIG. 8.—CERVICAL FOLLICULITIS WITH EVERSION OF THE CERVICAL MUCOSA—  
"EROSION" (Cullen).

tion affecting it are due to infections which come from below. Those pathogenic germs which exist in the vagina may cause inflammation of the vaginal face of the cervix, but they do not

invade the cervical canal, with one exception—the gonococcus. But where the cervix has been torn or cut and its severed lips are everted its glands become invaded by any germs which lie in the vagina.

**Cervical Folliculitis** (Fig. 8).—The follicles about the external os and on the vaginal face of the cervix have lost their covering epithelium and appear as elevated red papillæ giving rise to an “erosion.” Such “erosion” is elevated, not ulcerated, and the red elevated papillæ do not shade off into the rest of the surface, but end sharply. The cervix as a whole is enlarged and of deep colour. There is a sense of weight in the pelvis and the cervical discharge is increased. The temperature is not elevated. The Nabothian follicles may become involved, dilate, and contain clear glairy fluid or pus. The same is true of the glandular follicles. These changes may be general, producing cystic degeneration (Fig. 77), the cysts causing elevations upon the cervix of uniform size, which discharge their contents upon being pricked, leaving a pock-like depression. In old cases of cystic degeneration, where the involvement is general throughout the cervix, a train of disagreeable hysterical symptoms may be present.

**Endocervicitis.**—Except where the cervix is rolled outward because of tears, all acute primary inflammations of its lining membrane are due to the gonococcus. In cases of general septic infection, or in cervixes damaged by labour or operations, the septic cocci may cause inflammation. The cervical membrane is also the seat of certain slow changes which are designated inflammatory but rather appear as new growths.

*Symptoms.*—*Gonorrhæal Endocervicitis.*—Pelvic tenesmus and nervousness are present. The rise in temperature is but a fraction of a degree, the pulse is not accelerated. Owing to an attending vulvitis the symptoms of the latter add to the distress. Upon examination we find the cervix of deep colour, the external os eroded, and the canal filled by a plug of muco-pus. The least touch causes pain. We see the evidences of vulvitis and of urethritis.

**Septic Endocervicitis.**—If there be a recent injury to the cervix, and this has become septic, the tissues are livid, the raw surfaces covered by a pultaceous patch of granulation tissue. There is a sanious watery discharge at first, which subsequently becomes purulent, but the production of pus is not marked. INDEED, THE PRESENCE OF MUCH PUS FROM AN UNWOUNDED CERVIX IS ALMOST PATHOG-



**NOMONIC OF GONORRHOEA.** After the symptoms have subsided there may remain but a slight erosion at the external os or no evidence of the past inflammation, and yet deep down in the glands of the cervix the cocci may lie. This latency of gonorrhœal and septic endocervicitis must be borne in mind when operations on the cervix are contemplated. In collecting the discharge for examination to see if the glands are infected they should always be pressed by the fine wire. Lasser found only 9 per cent of cervical mucous plugs to contain the gonococcus; but when he squeezed the same cervical glands he got the gonococcus in 49 per cent.

In certain cases the mouths of the glands will block up and secretion continue. The glandular elements continue to grow until the structure appears as a *polypoid growth* hanging from the cervix. They are always soft and pedunculated, rarely arising from the vaginal face of the cervix, but most often from the cervical canal. They keep the canal open, and upon pressure will sometimes recede within it (Fig. 9). They have a tendency if neglected to become malignant. Or they may slough and produce a putrid discharge.



FIG. 9.—CERVICAL POLYPL.

**Treatment.**—In acute cervicitis all cysts must be punctured and the vagina lightly packed with antiseptic gauze, or douches of formaldehyde (1 to 10,000) or of bichloride of mercury (1 to 5,000) being given every four hours. If gonorrhœa is suspected, it is safer not to douche lest the discharge be washed higher up, but to pack around the cervix iodoform gauze wet in bichloride solution (1 to 5,000). In acute endocervicitis of gonorrhœal origin the pelvic tenesmus is much relieved by stabbing the vaginal face of the cervix with a sharp bistoury in a half-dozen places to produce local bloodletting. An applicator is then wrapped with cotton, and after sucking away the plug of purulent pus from the cervix by means of a syringe, strong tincture of iodine is applied to the cervical canal, up to the internal os only, by means of the applicator. This powerful diffusible antiseptic speedily destroys the gonococci. This application should be made daily until all symptoms disappear.



In acute septic endocervicitis if a plastic operation has been done all sutures should be removed. Raw surfaces should be painted with pure carbolic acid and an iodoform-gauze packing inserted. If the septic endocervicitis exists alone—a rare condition—no application is better than the iodine.

Most cases of endocervicitis are of gonorrhœal origin, and the DISEASE IS BUT PART OF A GENERAL INVASION OF VULVA AND URETHRA. The danger is that it may extend to the body of the uterus and Fallopian tubes, hence no instruments should ever be passed through an eroded cervix or one discharging pus, to the cavity of the uterus for purposes of examination.

In chronic gonorrhœal endocervicitis applications of all known germicides often fail to effect a cure. The patient remains in a condition which is a menace to herself and others. After all simpler means have failed the cervical mucous membrane should be excised by Schroeder's or some similar method. Repeated attacks of gonorrhœal endocervicitis and the application of strong antiseptics will in the course of time result in the production of much cicatricial tissue not only in the cervix but also in the pericervical areolar tissue.

*Polypoid degeneration* calls for operative treatment. If the polypus arises near the external os it may be clasped and removed by the cautery wire so as to burn its base. Narcosis is unnecessary. But if the polypi are multiple, or the cervical mucous membrane shows evidences of producing others, the membrane should be excised as high as possible. All such tissues removed should be subjected to microscopic examination to exclude or detect beginning adeno-carcinoma. The *differential diagnosis* of cervicitis and polypoid degeneration will be found under Cancer of the Cervix, with which disease they may be confounded.

### ENDOMETRITIS

Inflammation of the endometrium is far more important than of the cervix, as the internal os is the gateway to the higher organs of generation, and infection once having passed this point it is almost sure to extend to the tubes or pelvic peritonæum. Pyosalpinx, ovarian abscess, and pelvic peritonitis rarely occur except as the result of infection reaching these structures through the medium of the uterus. It is an accepted fact that pelvic disease

in women is increasing. This is due to three causes: the undoubted spread of gonorrhœa, the very general dislike to child-bearing and the induction of abortion, and to unskilled intra-uterine treatment by physicians.

Endometritis may be described as hæmatogenous, gonorrhœal, septic, and putrid, according to its ætiology.

**Hæmatogenous Endometritis.**—The endometrium being not a mucous membrane but part of the great lymphoid system, we may expect that conditions which strongly modify metabolism will be revealed in disturbances of growth and function of the endometrium.

In *phthisis pulmonalis* the membrane becomes pale, atrophies, and the monthly production of lymphoid cells and blood often ceases. This is amenorrhœa. There is a whitish leucorrhœa devoid of germ life.

In *gouty women* the very opposite is true. Here there is apt to be excessive growth of lymphoid elements at each menstruation; the endometrium is thickened and pours out a moderate amount of either whitish leucorrhœa or one darkened by the admixture of blood elements. The odour of such a leucorrhœa is apt to be offensive. The menstruation is increased.

In certain forms of *cardiac* disease, particularly mitral disease, the endometrium is often hypertrophied, with a resultant menorrhagia.

*Syphilis* has a marked effect upon the endometrium. It is as a late complication of syphilis that we see round-cell infiltration of the endometrium. The membrane becomes thickened and produces a profuse whitish leucorrhœa. The menstruation is painful, profuse, and clotted, and occasionally intermenstrual bleedings are observed. The disease is seen chiefly in women under forty, and the differentiation is to be made from cancer. It is not common, but should always be borne in mind. It is usually accompanied by general lymphatic enlargements. The uterus is enlarged. Fortunately, such women are usually sterile or abort early.

*Plasmodium* infection (malaria) causes after a time an atrophy of the endometrium; the general infectious diseases, as scarlatina and typhoid fever, cause hypertrophy of the endometrium and menorrhagia; but all these have but a temporary effect and the endometrium returns to a normal condition after they are cured.

The treatment of these several forms of endometritis is wholly embraced in the treatment of the causative general disease. In certain of the incurable diseases, like mitral lesions, the bleeding may be so profuse as to demand curettage but without general narcosis. When the periods are excessive, and delay is possible, the administration of the dried mammary gland has a restraining influence. The various forms of endometritis are mentioned more for the purpose of fixing the attention upon their possible existence than to illustrate their special treatment, AND TO SHOW THAT ALL FORMS OF ENDOMETRITIS ARE NOT DUE TO PATHOGENIC GERMS AND DO NOT DEMAND SURGICAL TREATMENT.

**Gonorrhœal Endometritis.**—The invariable causative germ is the gonococcus. There is a period of from two to four days before the symptoms begin after inoculation. Menstruation and intra-uterine instrumentation conduce to it. After a time the cocci enter the blood-vessels and are found in all parts of the uterine musculature. The usual sequelæ are peritonitis and salpingitis, the latter usually leading to pyosalpinx. Gonorrhœal rheumatism is occasionally seen to result.

*Symptoms.*—There is usually a history of a recent infecting coitus. Sharp uterine cramps usher in the disease. These are at first intermittent, but soon the pain becomes general over the pelvis. The patient takes to bed as the pain is severe. She lies on the back usually with knees drawn up. There is a rapid rise in temperature, rarely above 103° F., and the pulse is accelerated, but usually below 110. On the first, or at latest the second day there appears a profuse discharge, which rapidly becomes purulent. If the menses have just ceased the flow of blood may be re-established, and containing much pus. The production of pus is greater than we ever see from any other cause. There are *ardor urinæ* and dysuria. The disease rapidly extends to the Fallopian tubes, the extension being by direct continuity of tissue. In no case of true gonorrhœal endometritis have I failed to find tubal disease rapidly supervene. The cases in which this has been thought not to be the case were cases of severe endocervicitis, the infection stopping at the internal os. Upon examination we find signs of gonorrhœal vulvitis, either a drop of pus in the swollen urethra, or Bartholinitis, or the reddened cedematous nympha, except when the disease has been introduced by an instrument. Upon digital examination the moment the uterus is touched the

patient exclaims. The organ is exquisitely sensitive both to vaginal and abdominal touch. This is so great that in most cases it will be impossible to make a thorough bimanual examination. But if this can be accomplished it will be found that the entire uterus is enlarged. In neither broad ligament is there thickening, but deep pressure in the lateral fornices will, after the disease has lasted several days, show both Fallopian tubes enlarged and sensitive. If the speculum is used the cervix is seen as a swollen livid mass, its epithelium gone, and a rope of muco-pus protruding from the eroded os. In 15 per cent of cases vaginitis will also be found. The disease is easily recognised by clinical symptoms, but is proved by the microscope. The symptoms subside slowly, the leucorrhœa, however, continuing purulent for months. The endometrium returns to a normal condition, but the inflammation remains in the cervical glands. Upon any trauma being inflicted upon the endometrium, any exposure to cold, menstruation, or excessive coition, the endometrium may again become infected with a return of symptoms. Or, in rare cases, the infected tubes may leak into the uterus, the germs having lost some of their virulence, and we have established the nearest approach we have to *chronic gonorrhœal endometritis*. As a rule, the endometrium is either acutely inflamed or free from cocci. CHRONIC GONORRHOËAL ENDOMETRITIS WITHOUT ADNEXAL LESIONS DOES NOT OCCUR. The disease is essentially one of the non-pregnant uterus. The endometrium may entirely regain the normal state, leaving the Fallopian tubes involved. The discharge of pus may cease, the cervical plug becoming clear. But in 49 per cent of cases, even though all symptoms disappear, the germs will be found in the cervical glands. Repeated infections will ultimately result in the production of either pus in the tubes or in connective-tissue hyperplasia. The uterus will become a shrunken, hard mass or a large, hard mass of connective tissue. The endometrium will lose most of its lymphoid tissue, this being replaced by connective tissue. I have never seen a case of gonorrhœal endometritis conceive and go to full term. Sterility is the usual result, as seen so commonly in prostitutes.

*Diagnosis.*—This is to be made from septic infection. The test is finding the gonococcus in the pus from the cervix. But even that will not indicate the extent of the infection.

*Treatment.*—This may be general and local or by operation. If the former is elected, the vulvitis and vaginitis must receive

appropriate attention. Local bloodletting from the cervix will aid in reducing the congestion. If the cervix will admit the smallest Fritsch double-current catheter this should be introduced, and the cavity of the uterus washed out with a gallon of bichloride solution (1 to 10,000), followed by a gallon of saturated solution of boric acid. The patient should be in Sims's position, the cervix steadied by blunt bullet forceps, and the solutions should be of 110° F. temperature. The boric acid should be used once every twelve hours and the bichloride once in a day. The bowels should be kept open, particular attention being directed to keeping the rectum empty so as to prevent hard scybalous masses pressing upon the diseased organs. Opiates may be necessary to allay pain. After each bichloride washing the vault of the vagina may be painted with ichthyol (20 per cent) in boroglyceride. The local bloodletting may be repeated once. The object of this treatment is to reduce congestion, allay pain, and by the use of large quantities of mild antiseptics to overcome the infection. If the cervix is stenosed, or the nervous phenomena such that intra-uterine washings are impossible, the local bloodletting, ichthyol, and hot douches of  $\frac{1}{2}$ -per-cent lysol must be relied upon. AS WE SELDOM SEE THESE CASES IN THE FEW HOURS INTERVENING BETWEEN ONSET AND BEFORE INVASION OF THE TUBES THEY ARE USUALLY TO BE TREATED AS CASES OF ACUTE GONORRHOEAL SALPINGITIS.

**Septic Endometritis.**—This is always seen as the result of some trauma, or abortion before the third month of gestation. A raw surface must have been produced. The causative germs are streptococci and staphylococci pyogenes. In rare cases other germs cause it. The cocci soon penetrate deeply into the endometrium and into the lymph spaces of the uterine walls. They extend chiefly through the lymph spaces, less actively through the tubes. Fortunately the disease is not common except following abortion or unfortunate surgery. (See Metritis.)

Intra-uterine growths which slough may cause it.

**Symptoms.**—From twelve hours to three days after the infection—the usual period of incubation being somewhat over one day and less than two—there is a rise in temperature. This is accompanied by a sense of fulness in the pelvis. Occasionally there is a chill. The pelvic fulness in a few hours becomes a severe pain. But in large, soft uteri and uteri recently delivered there may be absolutely no pain. The constant pain is increased by occasional



uterine spasms. In a few hours the discharge of pus begins. At first it is muco-purulent, but soon becomes apparently pure pus. It is not profuse, and may be entirely wanting or only watery. It is apt to be blood-stained. Upon examination the absence of vulvitis is noted. The finger passes to the uterus without producing pain, but the uterus is very sensitive. Bimanual examination shows that the corpus uteri is enlarged and sensitive. The uterus is fixed by spasm of its ligaments. After a few days in one or the other broad ligament a denseness and thickening will be felt owing to involvement of the lymph streams and overlying peritonæum. Or there may be no sensitiveness and no pain; but this is seen only in uteri recently delivered and which are soft.

Upon using the speculum we find the cervix reddened, but not markedly so unless wounded. Hanging from the cervix is a muco-purulent plug, but there may be no discharge or only a little sanious fluid. Wherever there has been exfoliation of epithelium on the cervix or vagina there will be a yellowish gray patch. This is occasional in staphylococcic infection, but usual in streptococcic. If involution of the disease takes place the patient feels better in a few days, and may be up in a week.

*Sequelæ.*—The most common sequelæ are peritonitis, chronic metritis, salpingitis, ovarian abscess, abscess of uterine walls, and in order of frequency as stated. As a result of the peritonitis the uterus if retroposed becomes fixed, the tubes occluded, and the adnexa generally fixed. In the gravest cases there are no local signs whatever beyond scattered patches of pultaceous false membrane over spots from which the epithelium has been exfoliated and upon other raw surfaces; but there is a profound degree of septicæmia with complications remote from the seat of injury, such as pneumonia, endocarditis, and nephritis. Death may occur.

*Treatment.*—The tendency of authors is to describe but one form of septic endometritis—that occurring after abortion or labour. Were it not for the surgical accidents this might be true. But as we have to deal with the subject in all its phases we must describe that form of septic endometritis which is always caused by intra-uterine instrumentation and by no other means. If a filthy sound has caused it, the uterus should be thoroughly curetted and packed full of 10-per-cent iodoform gauze. If an infecting curettage has been the cause, the field of operation is covered by an unseen patch of streptococcus-laden plastic material. This should

be curetted away and the uterus packed with iodoform gauze. Mere irrigation of the uterus is useless as the cocci lie deeply in the endometrium. The object of the curettage is to remove diseased tissue and to create a raw surface for the absorption of the iodine from the iodoform gauze. In these non-puerperal cases the uterine muscle is so dense and the lymphatics so little developed that, as a *rule*, septicæmia is not marked, the extension of the sepsis being slow. But in many cases where polypi and fibroids have been removed in a septic manner, the uterine structure assumes the characteristics of a puerperal organ, and the treatment of such an organ is that of the puerperal septic uterus. It may even be necessary, in order to save life, to remove the mutilated and infected organ.

The general treatment must be stimulating; an abundance of water to flush the kidneys and assist in the elimination of toxins; strychnine; whisky; liquid diet while the temperature is high, and bowels kept regular.

Immediately upon extension of the infection to the adnexa or peritonæum, the exploratory *cul-de-sac* operation is indicated.

**Puerperal Sepsis** (Fig. 10).—This may be defined as a septic infection occurring during the puerperal month, after childbirth, or after abortion at or about the third month of gestation. Sepsis following abortion in the earlier weeks of pregnancy may be classed as *septic endometritis*. This classification is purely arbitrary, but is warranted by the lesions produced by the infection at the two periods of gestation, by the results of different lines of treatment, and by the complications seen to follow in neglected cases. The more virulent pyogenic cocci are present, streptococci or staphylococci. Occasionally other germs are found. The infection is at first always limited to the placental site or other wounded surface. After a time it may become general over the inside of the uterus. The clots in the sinuses may become infected, and these infected clots may extend high up in the body, forming the state known as *thrombophlebitis*. As a result of infection of the uterine lymph spaces we may have the muscle riddled with pus. The infection travels through the lymph streams and not through the Fallopian tubes. When the infection reaches the lymphatics of the broad ligaments it constitutes the state of *septic pelvic lymphangitis*. As a result of this there is a peritonitis of greater or less severity. There is produced serum or lymph or pus upon the free surface



of the peritonæum. Owing to the continuity of lymph channels between the ovary and broad ligament, the ovary may become involved, producing *acute ovaritis* with possible ovarian hæmorrhages or abscess. The lymph effused within the pelvis may seal up the Fallopian tubes, and these latter becoming infected may



FIG. 10.—RETAINED PLACENTA AND PUERPERAL SEPSIS.

Note the roughened placental site and the smooth surface of the septic endometrium.  
An unusual association of clinical phenomena.

produce a pyosalpinx. Or there may be a sudden stasis in the pelvis and the infection be so severe as to cause death before lymph effusion can take place; and in such a case the only gross lesion to be found in the pelvis is a friable livid uterus, upon the interior of which is a grayish-yellow patch of false membrane. The char-



acteristic general result of this form of infection is *septicæmia*. The remote lesions are those which may be expected from such a sepsis in such a locality—pleuritis, pneumonitis, endocarditis, nephritis. If the lymph breaks down into pus there may be first a purulent pelvic peritonitis, later becoming a general purulent peritonitis. The causative germs are found in the uterine walls, the pelvic lymphatics, occasionally in the blood, and wherever the complicating foci of inflammation are seen.

*Symptoms.*—There may or may not be a chill. As a rule, the temperature and pulse-rate rise steadily and rapidly. There is always a higher pulse-rate than can be accounted for by the temperature, and this is very significant. The face is at first flushed, but soon becomes pale and anxious. There is no pain. The lochial discharge suddenly ceases or becomes markedly decreased. In its place is a watery discharge slightly tinged with pus. There are no pelvic symptoms. A speculum examination shows the yellowish patch on any denuded surface in the vagina. Albumin early appears in the urine and leucocytosis is marked. Fluid taken from the interior of the uterus shows the presence of staphylococci or streptococci. Upon this examination rests a precise diagnosis and the proper treatment. Recovery may be complete with restoration of function in all the pelvic organs, but such a happy result is uncommon. Streptococci may also be found in the serum, lymph, or pus in the pelvic cavity, occasionally in the blood.

*Sequelæ.*—Pelvic peritonitis, general peritonitis, ovarian abscess, pyosalpinx, pleurisy, pneumonia, endocarditis with permanent heart disease, general lymphatic infection and suppuration, acute nephritis, are some of the results of puerperal sepsis. Death occurs either from poisoning of the heart muscle or nephritis. It is not my purpose to enter into an elaborate discussion of this disease, but only to say enough to show the importance of vigorously attacking it. Varying with the virulence of the infecting agent, the mortality is from 7 to 25 per cent.

*Diagnosis.*—This is difficult, and is to be made from general conditions which can give the puerperal woman fever, but more particularly from *putrid infection*. The uterus in a suspected case should be carefully explored by the finger. In unmixed septic infection the interior of the uterus is smooth, and there is no odour to the discharge. In putrid infection there will be a roughened surface inside the uterus and the discharge will be offensive. Se-

cretion taken from the uterine cavity by Döderlein's tube or some similar glass tube will show the exact nature of the infection. Too much stress cannot be laid upon this. In putrid infection the face is flushed, in septicæmia pale and anxious. In sapræmia the pulse is full and bounding, in septicæmia weak and thready. The condition in sapræmia is sthenic, in septicæmia there is shock, often profound.

*Treatment.*—Of all cases of puerperal fever but 25 per cent are septic, and of these from 7 to 25 per cent die when let alone, according to the virulence of the infecting agent.<sup>1</sup> But in those that recover, the *morbidity* is very high and destructive lesions remain. The administration of antistreptococcus serum to these cases is followed by a mortality of 33 per cent, while curettage alone has a mortality of 22 per cent. So these two methods of treatment are to be condemned. The *expectant treatment* is based upon the fact that in most cases but a limited area of the endometrium is involved, and upon a sublime faith in the resistant action of the limiting zone of leucocytes which are arrayed about the infected area. The patient is given large quantities of water to drink, saline enemata, and an abundance of liquid diet. But the essence of the treatment is in the enormous quantities of brandy and large doses of strychnine administered. This method of treatment seeks the preservation of life only, and has absolutely no influence upon the *sequelæ* of the disease. It is therefore rejected by the author, but is far more rational and infinitely less dangerous than the mischievous practices of curettage and antitoxine administration.

*The Author's Method of Treatment.*—Having observed the destructive action of iodine upon all cocci, the author sought a method by which the local and general streptococcic infection could be subjected to its influence. It is necessary to have the iodine penetrate all parts of the uterine walls. This is secured by curetting the uterus and packing it full with 10-per-cent iodoform gauze. In order to obtain a sterilization of the pelvic lymphatics through which the cocci have proceeded, the posterior *cul-de-sac* is opened by a broad incision and the intestines induced to leave the pelvis by lowering the patient's head. The pelvis is then filled with 5-per-cent iodoform gauze to the level of the

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<sup>1</sup> See the report of the Committee of the American Gynæcological Society on The Value of Antistreptococcus Serum in Puerperal Sepsis, 1899.



tops of the broad ligaments, thus completely isolating the infected uterus. It is advisable to employ the gauze in snugly folded strips so as to facilitate its removal (Fig. 133). In the disintegration of the iodoform free iodine is liberated. This is readily absorbed both by the inside of the uterus and by the peritonæum, and evidences of systemic saturation are manifested within a few hours, the iodine reaction being given by the urine and by the saliva.

Inasmuch as the toxins of the streptococcus have a particularly injurious influence upon the kidney, causing acute parenchymatous nephritis, it is my practice to close the operation by an intravenous infusion of from Oiv to Ovj of normal saline solution. In the after-treatment alcoholic stimulants and saline rectal enemata play a prominent part. The intra-uterine packing is removed and renewed in three days, to be finally removed in three days more. The *cul-de-sac* dressings are renewed in a week, and each five days thereafter until the *cul-de-sac* closes. *Upon making bacteriological examinations of the dressings from the uterus and pelvis in cases proved to be streptococcic, in every one the dressings have been shown to be sterile save for the presence of the colon bacillus.* No case not previously operated upon has died, and many have subsequently borne children.

In view of this experience, I am warranted in saying that vaginal and abdominal hysterectomy are positively contra-indicated and are uselessly mutilating. Still, hysterectomy is often demanded for the relief of the *remote results* of puerperal sepsis. The treatment of the primary condition must not be confounded with that of its sequelæ.

**Putrid Endometritis.**—Whenever there is dead material within the uterus it is apt to become infected by the saprophytic bacilli from the vagina. This is particularly true with pieces of secundines left after labour or abortion, and with polypi and fibroids which slough. The bacilli always lie superficially, never penetrate the lymph streams, and would be innocuous were it not that their site is particularly prone to become the seat of other more dangerous germs. There is slight thickening of the endometrium with multiplication of the lymphoid elements.

*Sequelæ.*—A low form of plastic peritonitis is sometimes seen. So long as the case remains simply putrid there is no danger to life.

*Diagnosis.*—This is to be made from sepsis. The microscope is

the test, but the clinical symptoms are sufficiently clear in most cases to render confusion impossible.

*Symptoms.*—There may be no subjective symptoms. As a rule, however, there is a certain amount of *sapraemia*, which is sometimes ushered in by a chill, high fever, flushed face, and tense pulse. Unless the local conditions which existed previously produce it, there is little or no pain. There is a profuse mucous discharge of ill odour, or purulent and putrid; but if a purulent discharge exists, it shows that the case is one of mixed infection.

Upon examination there is little or no sensitiveness either above the uterus or about its adnexa. The cervix is always more or less open, and if sufficiently so to admit a finger a rough elevated surface can somewhere be felt. The cervix is normal in appearance and the subjective symptoms are markedly in disproportion to the local lesions.

#### *Differential Diagnosis*

	Puerperal septicaemia.	Puerperal sapraemia.
Onset .....	Gradual, without chill usually. Sometimes chill and repeated.	Chill not usual.
Temperature...	If ushered in by chill, high at once. Usually gradually and continuously rises.	Maximum soon after onset. Usually stationary.
Pulse .....	Rapid from the first, more often at or above 120.	Rarely above 110.
Discharge .....	Watery at first; odourless. Purulent later.	Mucous and stinking.
False patch...	Always wherever epithelium is off.	Never present.
Complications...	Peritonitis, septicaemia, endocarditis, etc.	Rarely in neglected cases; plastic peritonitis.
Microscope ....	Streptococci or staphylococci pyogenes.	Saprophytic bacilli.
Endometrium ..	Smooth.	Always rough spot somewhere.
Leucocytosis...	As a rule marked, when the patient is near death often not increased. Violent fluctuations.	Slight increase; changes gradual and not violent.

Both conditions may exist in the same case.

*Treatment.*—The immediate indication is for a removal of the putrid mass. If it be a sloughing polypus or fibroid this must be removed and at the same time a general curettage should be done. If the infection is due to a bit of retained placenta after abortion or labour this spot alone should be curetted, the uterus washed out with saline solution and packed with iodoform gauze. If the case is seen late, after the occurrence of peritonitis, curettage and the exploratory *cul-de-sac* operation are indicated.

### TUBERCULOSIS OF THE CORPUS UTERI

This may occur as a primary invasion from the blood, or be secondary to a similar disease in the tubes or peritonæum. The disease is particularly apt to occur during the puerperal month, the placental site being the starting-point. This is due to auto-infection or to the bacilli being introduced by the examining finger or instruments. The disease is not infrequent. It usually begins at the fundus and extends downward. Ulceration begins soon after infiltration of the tissue by cells and bacilli. The ulcers are rounded, small, with uneven floors, ragged edges, and a cheesy layer at the bottom of the ulcer. All coats of the uterus are invaded in the course of time. The endometrium first, then the entire organ enlarges. The inside of the uterus becomes filled with a proliferating mass of granulation tissue which in places is deeply ulcerated. The new growth may entirely fill the cavity and block the cervix so as to produce a pyometra.

*Symptoms.*—There are none that are pathognomonic. The bacilli can be found in uterine scrapings. Amenorrhœa is very frequent; lessened menstruation usual, increased rare. Leucorrhœa is generally present, occasionally absent, and is muco-purulent. If menorrhagia be present the disease will simulate cancer. There is very generally an accompanying salpingitis or peritonitis from the beginning, whereas these usually follow late in cancer. In primary acute tuberculosis of the endometrium, such as supervenes during the puerperal month, the diagnosis may be impossible without the microscope. Tuberculosis occurs before the forty-fifth year, while cancer of the corpus uteri is rare before forty.

The differentiation between the two diseases is not essential, as the treatment is the same for both.

*Treatment.*—In view of the fact that tubal and peritoneal changes so frequently accompany this disease, extirpation of the uterus together with the adnexa is indicated. Short of this the best treatment is curettage supplemented by strong iodoform-gauze uterine packing. Iodine has a particularly destructive effect upon tubercle bacilli. Vaginal extirpation is preferable to abdominal as being accompanied by less risk of infecting the peritonæum and less shock. But when the general peritoneal cavity is involved abdominal section is the indicated operation; and here the uterus is removed merely because to leave it and its adnexa is to invite pelvic suppuration later.

**METRITIS. MYOMETRITIS**

These terms are used to generically designate the result upon the muscular coat of the uterine body of the various infecting agents, and of repeated injuries. The words could preferably be employed to express certain changes which result from very many different destructive agents acting upon the uterus. These results may be seen to follow either gonorrhœal or septic inflammation of the uterus. They may be due to operative procedures or to syphilis or to abortion or labour. In fact, almost any agent acting energetically upon the uterus, whether mechanical, chemical, or of bacterial nature, may produce marked gross changes in the uterine muscularis.

It will be remembered that there is no distinct connective-tissue layer lying between the mucosa and muscularis uteri. Consequently any severe inflammation of the endometrium will be accompanied by a more or less marked involvement of the muscularis. Metritis of a certain degree always accompanies endometritis when the latter is of bacterial origin.

As is the case in endometritis, we find that many cases of metritis are due to the exanthemata; and it is probable that as we improve our knowledge of the effect of the eruptive fevers of infancy upon the uterus, we will find that the congenital flexures and cases of dysmenorrhœa are sequelæ of systemic disturbances.

There may be simply a serous and cellular infiltration of the tissues. As a result the connective-tissue elements of the uterus are multiplied and the uterus is increased in size. Or the new tissue may subsequently contract and thus produce a diminution in the size of the organ. The infection may be so severe as to cause the death of the migrated cells, and pus be thus produced. The pus may be in the form of minute dots or one large abscess may form. There may be a general suppuration in all the lymph spaces, the uterus being converted into a sponge-like tissue filled with pus. The congestion may be so severe as to produce ecchymoses in the endometrium and between the muscular bundles. That type of metritis which is characterized by the production of much connective tissue is permanent, and the circulation of the organ is so modified that at each menstrual epoch sudden sharp hæmorrhages take place, causing a partial or general exfoliation of the endometrium accompanied by severe dysmenorrhœa.

When the disease is caused by syphilis the lesions are the same as in other syphilitic infiltrations of muscular tissue.

*Symptoms.*—From what has been said regarding the association between endometritis and metritis it may be inferred that metritis is but a stage in the progress of the causative factors of both. Therefore, the symptoms attributable to metritis are masked by those of the disease of which it is a feature.

*Treatment.*—Inasmuch as primary metritis is unknown its treatment must be largely if not wholly that of the disease of which it is but a stage. In contemplating the pathology of this disease we are struck with the fact that no infection of the uterus takes place which does not materially injure the muscular walls. The damage inflicted upon the muscularis is far greater when the infecting agent has been virulent enough to cause salpingitis or peritonitis. We cannot look upon the uterus as normal in any case of endometritis associated with tubal, ovarian, or peritoneal complications; for it is, apart from the precise and accurate findings of the microscopist, inconceivable that an infection should pass through the uterus of severity sufficient to destroy the tubes or produce peritonitis, and still leave the uterus undamaged. That the uterine muscle does occasionally recover after such pronounced infections is shown by the repeated cases of pregnancy following septicæmia. But it must be remembered that septic infection of the uterus is usually localized in one part of the organ, leaving the rest of it normal, whereas gonorrhœal infection is general. Therefore, we find conception occurring after recovery from septic metritis, but never after an attack of gonorrhœal metritis.

However, after the causative disease has been appropriately treated, much can be done to expedite the recovery of the uterine muscle. Treatment is of avail in saving the uterus only in cases where the inflammation has resulted in mere cellular hyperplasia. When pus, even in microscopic quantities, has been produced in the uterine walls, hysterectomy is indicated. The lesser degree of inflammation is improved by occasional depleting punctures into the cervix, and the routine application to the vaginal vault of medicated tampons, preferably those containing ichthyol 10 per cent in glycerin. After a mass of cicatricial tissue has been produced no treatment is of avail other than hysterectomy, and only a severe degree of suffering can warrant this.



**Subinvolution.**—This term is used to designate the results of an incomplete involution of the uterus following miscarriage or labour. The endometrium is thickened owing to glandular hypertrophy, the muscular cells are enlarged and fatty, the lymph spaces distended, and the vessels large. The condition is essentially an incomplete physiological state rather than a pathological. The organ is soft and enlarged. After a time connective-tissue hyperplasia takes place in the muscular walls. The uterus sinks low down in the pelvis, its ligaments stretch, and the veins in the broad ligament become distended. As remote secondary lesions are the various chronic changes in the ovaries, which follow long-standing congestion.

**Symptoms.**—The menses are increased, but normal in character and painless. There is present a constant pelvic tenesmus; and backache, dull aching in the thighs, general weariness, costiveness, anorexia, and anæmia are common symptoms. A peculiar train of nervous phenomena often appears. There may be periods of excitation followed by melancholia. In extreme cases a suicidal tendency is manifested. Upon examination the uterus is found low down, often retroverted, soft but not sensitive. There is very commonly present a milky leucorrhœa in sufficient quantities to necessitate douching.

**Treatment.**—If the case is seen during the second puerperal month, the uterus should be kept up in the pelvis by careful tamponade or a skilfully fitted pessary. Internally the patient should receive quinine and nux vomica with ergot as a tonic and to cause shrinkage in the uterus. My prescription for this purpose is: Ext. ergotæ aquos, gr.  $\frac{3}{4}$ ; ext. nucis vom., gr.  $\frac{1}{2}$ ; quiniæ sulph., gr. 2., t. i. d., a. c. The depleting tamponade of ichthyol (5 per cent) with boroglyceride will aid in the treatment. After the condition has lasted some months curettage is indicated, to be followed by the above treatment.

**Hyperinvolution.**—Occasionally after labour or some operation like trachelorrhaphy or curettage performed during the puerperal month, the uterus begins to shrink rapidly. In a few months the organ may be reduced to almost the infantile size. Menses cease or are very slight owing to atrophy of the endometrium. If menses do occur they are usually very painful. Leucorrhœa is not present. Upon examination the hard, small uterus is found high in the pelvis. The sound will show that its cavity is less than 2



inches. There is no known treatment of any value as a curative agent. Sterility is present, so pregnancy as a cure is out of the question. The pain is diminished by the use of ichthyol tampons of 10-per-cent strength twice a week. I have seen the dysmenorrhœa so severe as to require removal of the uterus. Coincidentally with this condition the ovaries frequently become sclerosed.

### PERITONITIS

The peritonæum becomes deeply injected, its colour varying from a delicate pink to a livid hue. Serum is poured out in quantity, occasionally blood-tinged. The endothelial cells shrink away from each other, leaving the underlying lymph spaces exposed. White corpuscles, then plasma cells, migrate to the free surface of the membrane, where they form masses of "plastic lymph." If the process subsides, these flakes of lymph become organized into transparent threads or bands or sheets of thin membrane supplied by blood-vessels and covered by endothelium. Or the plasma and white cells may die, forming pus. The smooth surface of the membrane is gone and the exfoliation of endothelial cells may be so general as to give to the membrane a granular appearance which bleeds upon touch. If pus is produced it is usually odourless, but may be putrid or tainted by intestinal gases.

*Causes.*—These are *direct* and *contributing*.

*Direct.*—Peritonitis in women is caused by the gonococcus, staphylococcus, streptococcus, pneumococcus, colon bacillus, bacillus aerogenes capsulatus, saprophytic bacilli, tubercle bacilli, and the germs which produce the eruptive fevers. A certain form of adhesive peritonitis is produced by various chemical irritants, and by trauma inflicted upon the peritonæum.

*Contributing.*—The peritonitis due to the gonococcus we find most frequently at the menstrual periods. This is because at this time the protecting epithelium of the endometrium is damaged. Any injury or trauma inflicted upon the uterus or peritonæum which will facilitate the absorption or extension of germs will contribute to peritonitis. Any agent which will produce marked venous stasis in the pelvis may cause exfoliation of endothelium and migration of germs from the bowel, or from a point where they have remained latent. Such an agency is prolonged exposure to cold. The mechanical effect of neoplasms rubbing off the endo-

thelium also conduces to peritonitis. Those germs which are commonly in the large bowel may cause peritonitis in chronic constipation. The breaches of surface accompanying abortion and labour and operations upon the uterus and intra-peritoneal operations are frequently the points at which infection starts and reaches the peritonæum; and the peritonitis occurring under these circumstances is usually septic.

Manipulation of the viscera during operations may rub off the endothelium and lead to peritonitis. A plaque of lymph may be effused, the lymph become converted into a sheet of thin membrane, the underlying peritonæum continue to pour out serum, and in this way a peritoneal cyst be formed. Some of these cysts reach a considerable size, even 8 inches in diameter, but as a rule they are small.

*Symptoms.*—There is at first an effusion of serum. It is impossible to determine its presence upon examination. Plastic lymph is next poured out upon the site of infection. Within a few hours this becomes organized into a new tissue by the formation of delicate capillaries. This lymph tends to hold immobile the organs between which it lies. Fixity of the involved area is a consequence. If this lymph be produced in quantity it will not only fix but will completely isolate the point of infection from the general peritoneal cavity. The less the degree of virulence of the infecting agent the greater, as a rule, the effusion of lymph, for the most virulent germs produce such a circulatory stasis that the migration of plasma cells is impossible. If the lymph is effused upon the surface of the broad ligaments these are thickened and stiffened thereby. As a consequence the uterus which is supported by these ligaments becomes also fixed and loses its bilateral mobility. Upon examination the lateral vaginal fornices are found to have lost their elasticity and in each is a dense infiltration which does not fluctuate.

If the lymph is effused upon one broad ligament only the cervix cannot be moved away from the side involved; and if the cervix is pulled down it will swing away from the median line, being held towards the side inflamed. When the lymph is effused about a pus focus or tumour it increases its size and fixes it. Fluid accumulations may in this way, as a result of repeated infections, become so inclosed in a mass of lymph as to be mistaken for solid tumours. If the effusion has taken place about a hollow viscus in

distention this is fixed in this state and cannot contract fully, as is seen in the case of the bladder and rectum when so involved.

The ovaries and tubes remain attached to whatever organs they rest against when the lymph is effused about them.

The lymph is either absorbed or converted into pus or into adhesions. The density and firmness of the resulting adhesions are much less than would be supposed in view of the very generous outpouring of lymph. In addition to binding the organs together these adhesions distort the softer tissues, and by constricting nutrient vessels they cause atrophic changes. The lumen of the Fallopian tube may be strictured, the ovary shrunken, the ureters obstructed, producing hydro-ureter, and the intestinal peristalsis interfered with. The new vessels in the adhesions may be so large as to be a source of additional blood-supply to the adherent organs. In this way omental lipomata are formed, and tumours may become detached from their original seat and be wholly nourished by the vessels of adhesions, and the spleen be in this way much enlarged. By means of adhesions the uterus may be fixed in lateroversion or retroversion.

Adhesions forming between the pelvic organs and the intestines in middle life may, when the atrophy of old age ensues and the uterus sinks down into the pelvis, cause serious flexures in the bowels.

The presence of pus free in the peritoneal cavity cannot be detected upon examination, but when the pus is locked in by a mass of lymph it presents the same physical signs as pus in a preformed sac. In all cases of purulent peritonitis there is marked œdema in all the tissues, which adds to the fixity of the organs, and which may extend to the retroperitoneal structures like the muscles of the pelvis, or to the cutaneous surface of the abdomen.

*Sensitiveness* upon pressure is present in most forms of peritonitis, but is slight when serum alone is produced, is marked when lymph is effused, and most severe when much lymph and pus are together produced. But in certain grave forms of primary suppurative peritonitis the absence of sensitiveness is notable. *Muscular rigidity* over a spot of peritonitic inflammation is very usual and an important sign.

*Tympanites*.—This is more or less present in all forms. When the peritonitis is acute the œdema and cellular infiltration of the intestinal coats interfere with the peristalsis. Later, adhesions

limit the intestinal movements so that faecal matter is retained and putrefies. Certain medication in the treatment of peritonitis, as opium, increases the tympany by paralyzing the intestines.

*Pain.*—This is slight in the stage of serous effusion, increases as lymph is effused, particularly if this is sudden and marked, and is greatest in the purulent form. But in primary suppurative peritonitis of severe type pelvic analgesia is often present. In the course of pelvic peritonitis a sudden cessation of the pain accompanied by grave constitutional symptoms often points to a change of the inflammation to the purulent type. Pain is always increased by movements of the body, particularly by contractions of the psoas and obturator muscles, and by action of the bowels.

*Temperature.*—In the stage of serous effusion the temperature is not elevated unless the beginning peritonitis be due to the streptococcus. As lymph effusion occurs the rise in temperature will vary greatly with the kind of infection. In gonorrhœal peritonitis at this stage the temperature rarely rises to 102.5° F. The same is true in the peritonitis due to the colon bacillus and staphylococci. A temperature holding steadily about 103° F. for more than a day, particularly if occurring as the result of some trauma to the uterus or to the peritonæum, should cause great uneasiness in the medical attendant, and is usually due to streptococci. As a rule, the evening temperature is somewhat higher than the morning. A free elimination of the toxins by the kidneys and bowels causes a reduction in temperature.

*Pulse.*—This, like the temperature, varies with the infecting agent. It is lowest in the peritonitis caused by colon bacilli, gonococci, and staphylococci, and higher when the more virulent streptococci and pneumococci are present. The relative marks of temperature and pulse are important, a high pulse-rate with a comparatively low temperature occurring in those infections which produce septicæmia. The mere effusion of serum or lymph does not cause the rise in pulse and temperature. We see large quantities thrown out about a gauze drain and both temperature and pulse remain normal. The disturbance is due to the toxæmia produced by the germs which cause the peritonitis. The *respiration* is accelerated and the breathing is thoracic in extensive peritonitis.

*Rigors.*—These are not features of peritonitis except when there is a sudden elevation of temperature from a point near 101°

to one 3° to 4° higher. Rigors are symptoms of general septicæmia rather than of peritonitis.

*Digestion.*—There is overproduction of bile, hence overloading the stomach may result in vomiting. Otherwise vomiting is not a symptom of pelvic peritonitis unless suppurative. The higher the invasion of the peritonæum the greater the tendency to vomit. Persistent vomiting, accompanied by high pulse and fever, points to an ascending peritonitis. The stomach may reject the liquid and foods taken, or vomiting may occur even when the stomach is empty. The vomitus may be clear and watery, or greenish or brown bile, or blood-stained from hæmorrhages into the stomach, or even stercoraceous. As a rule, in peritonitis there is a disposition to hyperacidity with fermentation of starch foods and sweets. Animal broths and red meats are well borne. The bowels are usually confined for reasons stated, but in septic peritonitis diarrhœa is common.

The *mind* is clear in even fatal peritonitis until the very last hours, when muttering delirium occurs. Active delirium is unusual. The *facies* are those of one in pain, but in deep sepsis the face is pale and apathetic, as of one in great shock.

The *kidneys* are not directly affected by peritonitis. If the peritonitis be due to streptococci, acute parenchymatous nephritis is a common complication.

Peritonitis due to streptococci may be accompanied by other remote lesions produced by that germ, such as endocarditis, pneumonia, and pleurisy. In fact, it is not usual for a case of streptococcic peritonitis to recover without some grave complication.

Death from peritonitis is immediately due to the poisonous effect of the toxins upon the heart muscle.

*Diagnosis.*—This is not difficult after the effusion of lymph occurs. The chief difficulty is found in determining when pus is produced and when the inflammation ceases to be pelvic and has become general. Purulent peritonitis is usually preceded by abortion, labour, or some trauma to the abdominal or pelvic organs. A pulse above 110, temperature at 103° F., pale apathetic face, sordes on teeth, dry coated tongue, slight delirium, uterus fixed in pelvis, vaginal vault arched and hard with a boggy mass in the posterior *cul-de-sac*, point to suppurative pelvic peritonitis. Peritonitis due to gonococcus is accompanied by symptoms of gonor-



rhœa of the vulva and tubes. Peritonitis due to the colon bacillus is usually of gradual onset and not discovered before plastic effusion has taken place. In abdominal peritonitis the muscles over the inflamed area become rigid and resistant to pressure. With the stethoscope crepitus can sometimes be heard in the early stage of plastic effusion. In all forms of peritonitis there is leucocytosis, but in cases near death the leucocyte count may rapidly fall. Peritonitis due to streptococci gives the highest leucocyte count, the lowest accompanying peritonitis due to the colon bacillus.

*Prognosis.*—When the inflammation produces serum and lymph only, recovery is the rule. In certain rapidly fatal streptococic cases death ensues before inflammatory products are effused. Most cases of primary suppurative peritonitis die unless operated upon, and even with operation they are apt to die. The prognosis is governed by the virulence of the infecting agent, the amount of it introduced, the state of the locality injured, and the general condition of the patient. Peritonitis in those suffering from cardiac disease, from diabetes, and from nephritis, is particularly fatal. Peritonitis following criminal abortion and instrumental deliveries, and all intra-abdominal operations in which there is much crushing and bruising of the tissues, is of severe type. The peritonæum when uninjured has marvellous resistant power. The peritonitis may be limited to a certain area, as the pelvis, known as pelvic peritonitis, or be designated by an organ it surrounds, and be known as peri-oophoritis, perimetritis, periproctitis, etc.; or it may be general. As a rule, the higher the seat of inflammation the greater the danger. Certain areas of the peritonæum are particularly resistant, notably the covering of the colon and that of the pelvic organs. The peritonitis due to sloughing fibroids, ovarian cysts with twisted pedicles, ruptured dermoid cysts, and ruptured pyosalpinx, is of a particularly virulent type.

*Treatment.*—From what has been said regarding the causes of peritonitis, it will be seen that the author is not one of those who believes in idiopathic peritonitis, and that he looks upon peritonitis as an exponent of an infectious process rather than as a disease *per se*. Therefore, whatever treatment is adopted must be in the light of the cause of the peritonitis. In fact, peritonitis is rather a protective and beneficent process, an attempt on the part of Nature to check and limit an invasion by harmful agents.

The method adopted by the peritonæum is very effective in most cases, though remotely injurious, and the lesions produced by peritonitis show the extent of this.

Although it is more precise to treat the cause of the peritonitis, yet it is desirable also to limit the peritoneal effusion at the same time. Hence, surgeons have begun to not only cleanse the point of entrance of the noxious germs, but also coincidentally to enter the peritoneal pouch.

I believe that any treatment of peritonitis is incomplete which does not at the same time attack the infecting agent.

The treatment of pelvic peritonitis embraces agents which act indirectly and those which are applied directly to the inflamed membrane.

Among the indirect methods of treatment by far the most effective is the cleansing by operation and antiseptics of the point of entrance of the infecting germs. These cleansing methods will be described in other places. Of the other agents which act indirectly the most potent is *cold*. This may be applied as an ice-bag over the lower abdomen, or as a continuous vaginal irrigation of water cooled to 60° F. Cold furthermore causes contraction in the unstriped musculature of the deeper organs and dilatation by paralysis of the superficial capillaries. It therefore is a depleting agent. Cold increases pain for the first few moments of its application, after which it diminishes it. It limits the amount of lymph effused but apparently increases the serum, and has no effect upon the suppurative type of peritonitis. Next to cold, *heat* is the most efficient, indirect controlling agent of peritonitis. It is applied by abdominal poultice and vaginal douche. Heat has little effect upon the acute inflammation, but is of undoubted efficacy in chronic peritonitis, more accurately expressed as subacute peritonitis. Here the vaso-motor nerves are stimulated, blood in stasis drawn away from the inflamed area, and the flow of fresh blood to the part induced. To accomplish this the abdominal poultice must be of flaxseed meal and as hot as can be borne, and the vaginal douche of not less than 110° F., and repeated every few hours. This method of treating subacute pelvic peritonitis must be persisted in so long as the disease lasts, often for years. It is a makeshift, nothing more nor less.

*Local bloodletting* by depleting the peritonæum tends to limit the peritoneal effusion in the pelvis and reduces the pain. It is

obtained in pelvic peritonitis by puncturing the cervix and can be protracted by hot vaginal douching.

The pelvic congestion is much lessened if the rectum is kept empty by *enemata*. These also reduce the pain by removing scybulous masses which press upon the diseased organ.

The application of local *antiseptics* which are absorbed, such as ichthyol glycerin on tampons, not only reduces pain but also tends to limit the peritoneal effusion. Any agent which slows the heart's action and contracts the arterioles will reduce the pain and lessen the production of serum and lymph. Such agents are *aconite*, *antipyrine*, and other coal-tar derivatives. *Opium* should never be used in peritonitis if it can possibly be avoided. It undoubtedly prevents mobility between and spasm in the tissues underlying the inflamed peritonæum, but it produces a most disagreeable retention toxicosis. By it the bowels are locked up, the stomach digestion spoiled, tympany induced, and the entire body tone lowered. It relieves pain, but this is a borrowed relief which must be paid back later by vomiting, tympanites, and costiveness, and medication to relieve these. Certain symptoms of peritonitis are much relieved by medication and nursing. The temperature and pulse-rate are lowered by increasing the quantity of urine and flushing out the colon. Both are accomplished by the daily administration of mild doses of saline laxatives, the ingestion of large quantities of water, and by high enemata of normal salt solution. I am opposed to the administration of drastic purges. In a series of cases of streptococcus peritonitis the first high saline enema was followed by an average fall of 1.5° F. in temperature and ten pulsations of the heart. Agents which sustain the vital forces and increase cellular activity aid the tissue resistance. Such are moderate doses of brandy and strychnine. The attempt to cure peritonitis by this very old method of treatment and by keeping the woman drunk and half-poisoned by strychnine is to be deprecated.

The *hysterical* symptoms occasionally seen in peritonitis are best controlled by hyoscyamus or hyoscyamina.

The *posture* of the patient should be supine, the limbs should be kept still, as to move them is to contract the psoas and iliacus muscles, and the pelvis should be elevated except in suppurative peritonitis. Whenever there is a suspicion of pelvic suppuration the head and shoulders should be elevated so as to keep within the



pelvis all the fluid products of the inflammation. Peritonitis occurring about an ovarian cyst whose pedicle has twisted or about a sloughing fibroid tumour, calls for the immediate section of the abdomen and removal of the cause.

The treatment of post-operative peritonitis and of those forms of peritonitis which occur in conjunction with pelvic inflammations will be separately considered.

**Myxomatous Peritonitis.**—This rare disease is also known as gelatinous peritonitis and pseudomyxomatous peritonitis. The peritonæum is thickened and of deeper colour than normal. There is little serum and fibrin produced, but a great quantity of straw-yellow, transparent gelatinous material. This lies loose in the peritoneal cavity, from which it may be scooped out in masses. At certain points the jelly may have a whitish colour due to the admixture of fibrin. The jelly is secreted by the peritoneal endothelium. The disease is usually secondary to myxomatous degeneration of some abdominal organ, as the ovary, but is reported to occur primarily. My belief is that it is always secondary. It is essentially chronic in its course. The patient notices a steady increase in abdominal enlargement, which is painless, accompanied by no temperature and devoid of general debility. Or, if a small ovarian cyst of this nature ruptures, there may be more or less of temporary shock, and then the progressive abdominal enlargement. The symptoms and signs are nearly those of ascites; but fluctuation and change of fluid level by posture is not usual in myxomatous peritonitis. Having found such a condition during an operation all the gelatinous material should be removed by means of the hand, followed by saline irrigation of the peritoneal cavity.

Then a careful search should be made for the usual cyst of the ovary whose rupture has led to the disease. I have seen 3 cases of this disease, in one of which there was recurrence of the affection in seven years. After the operation drainage is unnecessary.

**Tubercular Peritonitis.**—Tubercular peritonitis occurs as secondary to miliary tuberculosis of the lungs, and is then hæmatogenous, or as an extension from some pelvic or abdominal organ, and is then lymphagenous, or very rarely as a primary affection. When the infection comes to the peritonæum through the blood the grayish tubercles of rounded form and equal size become implanted

beneath the unbroken endothelial cells. When the bacilli come through the lymphatics there is greater disturbance of the membrane; it becomes hyperæmic and the endothelium proliferates, and there is produced a copious serous transudation often tinged with blood. Sometimes the lymphagenous type particularly affects the lymphatics of the mesenteries of the viscera and gives rise to rapidly growing tumour masses. The disease may remain local for a long time and spontaneous recovery take place, but it usually shows a tendency to become general. The effusion may be either serous, plastic, or purulent, in the latter event being always a mixed infection. The effused lymph binds and mats the organs together, and the amount of fibrinous material may be so great as to form a mass filling the abdomen through which the intestines extend as permanently distended burrows. Clinically the disease is divided into three classes: the miliary, the fibrinous or caseous, and the lymphatic. All types may be found in the same case. The disease may occur at any age, but is most common between the ages of twenty and forty. It is most common in the negress, and about 50 per cent of the cases are inherited. It seldom produces general tuberculosis.

We find it secondary to lung tuberculosis, to intestinal tuberculosis, to tuberculosis of the uterus, and as a most acute process occurring post partum. Often the origin is so obscure that it appears primary. The organ over which the affected peritonæum lies often becomes much thickened, notably in the case of the omentum. The peritonæum is much thickened, loses its elasticity, and is easily peeled from the abdominal parietes. In colour it may be pale in the miliary type, but when thickened it is of a deep red hue. In the lymphatic type the organs under the inflamed membrane become exceedingly friable and tear even under gentle handling. In the fibrinous type the adherent organs show no "plane of cleavage" through which they may be separated, but are so glued together that attempts to separate them either tear the thickened peritonæum or the underlying tissue.

*Symptoms.*—By far the most constant symptom is *pain*. It is present most of the time with occasional sudden and violent exacerbations. The pain is usually over the seat of infection, but if there is much involvement of the peritonæum over the small intestines, the pain radiates about the umbilicus. If the peritonæum of the pelvis is involved there will be dysmenorrhœa and other

functional disturbances. (See Tuberculosis of the Uterus, Ovaries, and Tubes.)

*Tympany* is commonly present, the intestines being continually distended by gases. *Constipation* is usual. In certain cases there will be noticed a progressive abdominal enlargement. If this be due to great serous effusion the enlargement will be elastic and have other symptoms of ascites. If the enlargement be due to tubercular glandular growth there may be presented a rapidly growing solid tumour immovably fixed and about which is much fluid. If there be fibrinous peritonitis the entire abdomen may be filled with a solid tumour through which course tympanitic areas, which latter do not change relations to the tumour upon change in posture.

Very often pain and frequency in urination are present.

Usually *fever* is present. It is least apt to appear in the miliary form of the disease unless general, is commonly present in the fibrinous, and always high in the lymphatic and purulent types.

The *pulse* corresponds to the temperature.

In general appearance many patients appear perfectly healthy, particularly if the disease be miliary. In the fibrinous and lymphatic types emaciation is the rule. The disease if lymphatic often assumes the type of irregular malarial infection with repeated chills and fever. At best, however, the symptoms of tubercular peritonitis are not clear, and a diagnosis must be arrived at largely by exclusion. One observation of importance is that unless pus be present tubercular peritonitis does not produce leucocytosis, but causes a mild secondary anæmia. Upon examination, in miliary tuberculosis the symptoms are exactly those of ascites. But there is absence of the usual causes of ascites and the subject of tubercular peritonitis is usually younger than would be one having liver or other disease sufficient to cause ascites.

In the lymphatic type and in the fibrinous form of the disease the abdominal enlargement very often assumes the characteristics of an abdominal tumour, but devoid of mobility. The chills, the fever, the pain, and the usually rapid progress of the case will aid in the differentiation.

OWING TO THE FREQUENCY OF ABDOMINAL AND PELVIC TUBERCULOSIS, WHENEVER A PATIENT PRESENTS IN WHOM THE CAUSE OF AN EXISTING ASCITES IS NOT KNOWN, AN EXPLORATORY ABDOMINAL SECTION IS INDICATED.



*Treatment.*—There is no known medical treatment of tubercular peritonitis. The pain may be relieved by codeine or other opium derivatives, and other distressing symptoms alleviated by appropriate remedies. The disease always calls for an abdominal section except when it is known that it is confined to the pelvis, and that the uterus and its adnexa are so involved as to demand removal. The operator must evacuate all fluid and wash out the abdominal cavity with large quantities of normal salt solution, and close the abdomen without drainage. If the case be one of miliary tuberculosis limited to a small area of peritonæum, I am in the habit of allowing a piece of iodoform gauze (20-per-cent strength) to rest upon it while applying the sutures, removing this gauze just before tying the sutures. A cure is effected in about 30 per cent of cases where the disease is not general, and in many of those. The manner in which a cure is effected is not positively known. It is my opinion that the release of intra-abdominal pressure by the section and evacuation of fluid, allowing as it does a sudden marked influx of fresh blood to the peritonæum, destroys the bacilli. If the case be found to be one in which there is advanced involvement of the subperitoneal tissues, particularly of the mesenteric glands, a cure is not to be expected. Likewise if the intestines be matted together by fibrinous material a cure is very rare. In the lymphatic type the abdomen should at once be closed after evacuating the serum. In the fibrinous type, if the intestines are matted together, no attempt should be made to free them. In 2 such cases where I was enabled to work down to the pelvic floor I introduced a large drain of iodoform gauze. The iodism following this effected a cure. In no case where there is much serous effusion should drainage be employed, for a permanent fistula may result, and it is most difficult to prevent the drain becoming infected. Therefore drainage is not to be employed in the miliary type, rarely in the fibrinous, and never in the lymphatic form of the disease. It is unwise to remove ovaries or tubes the peritoneal covering of which is involved, unless they are structurally diseased. In their removal great care must be employed in the manipulation, for the tissues are almost as friable as in cancer. The application of ligatures must be made deep down in the pelvis for the same reason.

## SALPINGITIS

Gonorrhœal salpingitis. . .	{ acute
	{ chronic
Septic salpingitis. . . . .	{ acute
	{ chronic
Tubercular salpingitis . . .	chronic

**Acute Gonorrhœal Salpingitis** (Fig. 11).—The disease is caused by gonococci introduced into the vagina by a man who is suffering from either an acute gonorrhœa or a gleet, or is due to the activity of "latent gonorrhœa" in the woman herself, or is introduced by examination or instrumentation. The disease is always bilateral, though the involvement may not be the same on both sides. There is at first œdema and congestion of all the coats of the tube. As



FIG. 11.—ACUTE BILATERAL GONORRHOËAL SALPINGITIS. VAGINAL ABLATION.

the infection reaches the fimbriated end of the tube the fimbriæ fold into the lumen of the tube, a local peritonitis results, and the tube becomes closed by agglutination between the approximated peritoneal surfaces. The results of inflammation are always at first purulent, and, being thus locked in there is formed a purulent salpingitis, then a purulent "retention cyst" or *pyosalpinx*. The production of pus may be very little and of serum great; the pus cells may entirely disappear, leaving the tube distended by serum forming a *hydrosalpinx*. But hydrosalpinx from gonorrhœal infection is rare. Or there may be great production of connective tissue in the tubal walls with constrictions of the lumen



and permanent distortions, forming *pachysalpingitis* or tubal sclerosis, which may coexist with pyosalpinx. The endothelial covering of the tube exfoliates, leaving the subperitoneal coat exposed, deeply injected, and rough-appearing from isolated spots of lymph effusion. A greater or less degree of pelvic peritonitis is always present. Gonococci may be found in all coats of the tube.

At first the tube is exceedingly friable, is deeply discoloured, and tears easily. Upon section it is found that most of the thickening is due to cellular and fluid infiltration of the walls of the tube, and that the lumen is not much distended. The œdema is so great that often the tubal rugæ are obliterated as separate folds. At first the creamy pus escapes from the tube into the uterus, but after a time the uterine opening of the tube becomes obliterated and the pus is retained.

Restoration to a normal condition without surgical intervention is rare, some permanent alteration in the tube being usual. The heavy organ sinks low down behind the broad ligament, where it and the ovary, owing to adhesive peritonitis, may form a conglomerate mass plastered to the broad ligament or uterus.

*Symptoms.*—We usually see evidences of a recent gonorrhœal urethritis or vulvitis, and gonorrhœal endometritis is always present. In addition to the symptoms of the coexisting complications, the acute inflammation of the tube produces spasmodic pains in the tubal regions which radiate downward and to the thighs. After the muscular spasm in the tubes is stopped by the intensity of the inflammation and œdema the pain in the affected side becomes continuous. The pain may also be of a boring character through the corresponding sacro-iliac joint. The rectal temperature rarely goes above 103° F., and the pulse commonly ranges below 110° F. Nausea and vomiting are occasional. Owing to the coexisting peritonitis the bowels become inactive and tympanites results. The symptoms are most severe up to about the fifth day, but after that partial local analgesia is produced by the fluid and cellular infiltration of the tissues. The disease is always bilateral. Upon vaginal *examination* the lateral fornices are found tense and the uterus fixed by inflammatory exudate and muscular spasm. The diseased organs are most sensitive to pressure, and it is impossible to exactly map out their contour. In fact, it is improper to inflict such injury upon them as accompanies a thorough bimanual examination.

*Diagnosis.*—The history, the evidences of gonorrhœa elsewhere, the absence of trauma to the uterus, the presence of bilateral pelvic peritonitis, not preceded by abortion or labour, corroborated by the microscopic finding of the gonococcus, make the diagnosis clear and easy. The differentiation is to be made from the various pelvic neuralgias, ectopic gestation, sepsis, intraligamentous fibroids, and small suppurating ovarian cysts.

Upon *exploratory vaginal* section, serum and lymph flakes escape. After inserting the finger the tender recent attachments between the organs are felt and easily broken, and thick creamy pus may escape as the fimbriated ends of the tubes are liberated. The exact contour and relations of the involved tube can be easily appreciated. As the false attachments are broken slight parenchymatous oozing results. Upon inspection the signs of intense inflammation described above are found.

Upon *exploratory abdominal* section the tympanitic intestines are first encountered. Upon lifting the omentum the fundus uteri is seen, to which may be attached the sigmoid, the appendix vermiformis, knuckles of small intestines, or the omentum. The adhesions are readily broken into, and after lifting the intestines the diseased tubes will be found usually deep down in the pelvis behind the broad ligaments and uterus. They are frequently found to be completely hidden from view by the agglutinated mass of superimposed omentum and intestines, and this must be proceeded through before the organs sought can be inspected.

*Treatment.*—When an acute gonorrhœal salpingitis has occurred one of two plans may be followed: the case may be treated expectantly. It will be found that the pain is lessened if the rectum is kept free from scybalous masses that press upon the tubes. Local bloodletting from the cervix reduces the vascular tension. If the vault of the vagina and cervix are painted with 20-per-cent ichthyol in glycerin, in a few hours slight local anæsthetic effect is induced. An ice-bag over the suprapubic region affords some patients relief. Others find that very hot douches and poultices give comfort.

The douches should be mildly antiseptic, preferably lysol ( $\frac{1}{4}$  per cent) or bichloride of mercury (1 to 10,000). Poultices, ice-bags, and douches have no controlling action upon the infection. Local bloodletting and ichthyol every other day somewhat aid the



tissues in their resistance to the germs. The surgical treatment embraces the evacuation of the products of inflammation by curettage and the posterior vaginal section, vaginal ablation, or abdominal section and removal of the diseased organs. In first attacks the curettage and vaginal section are indicated. After repeated attacks the repair power of the tubes is so damaged that the radical vaginal or abdominal operation is indicated. Pyosalpinx never forms if the *cul-de-sac* is opened as soon as it is found that the infection has extended outside the uterus, and the tubes treated through the incision. This operation prevents suppuration, the expectant treatment encourages it.

*Sequelæ.*—The neglected cases go on to the formation of a sacculated pyosalpinx, or pachysalpingitis, or a combination of both, very rarely to form a hydrosalpinx—all with many adhesions. Long-standing tubal suppuration may induce a similar process in the adjacent ovary.

**Acute Septic Salpingitis.**—The usual causative germs are staphylococci or streptococci. Sometimes these reach the tube by extension along the lining membrane of the uterus. As a rule, however, there is first a pelvic peritonitis due to the extension of a sepsis by way of the lymphatics from the endometrium, then a secondary salpingitis. Therefore we most often see this form of salpingitis occurring after abortion or labour, in which states the lymphatics are particularly active. Occasionally, owing to unclean intra-uterine operations, an ectopic sac will become infected and produce an acute septic salpingitis.

The gross lesions produced by this form of infection are identical with those of the gonorrhœal. The microscope alone will differentiate the cause. The disease is often unilateral.

*Symptoms.*—There is always a history of a wound to the uterus, either by an instrument or abortion or labour. The onset is frequently ushered in by a chill. The temperature rises rapidly and the pulse is high. A temperature of 102° to 104° F. and a pulse usually over 110 are the rule. The subjective symptoms are the same as accompany gonorrhœal salpingitis. There is no accompanying urethritis and vulvitis. Whenever the epithelium is off the cervix or vagina a patch of false membrane is seen if streptococci are present. The accompanying endometritis produces a watery pus rather than the profuse thick discharge of gonorrhœa. The vaginal section and abdominal section show the same lesions

as are found in gonorrhœal salpingitis, except that one side of the pelvis may be found perfectly normal.

The possibility of a mixed infection by both gonorrhœal and septic germs must not be forgotten.

*Sequelæ.*—Acute septic salpingitis either runs into a chronic state or produces an ovarian abscess or a general septicæmia, sometimes fatal, or resolves with the absorption of the pus and the production of a hydrosalpinx or the conversion of the tube into a pachysalpingitis. Most cases of hydrosalpinx are due to sepsis.

*Treatment.*—There are two lines of treatment, the expectant and the surgical. The expectant treatment is the same as that for gonorrhœal salpingitis, only it should be supplemented by the internal administration of stimulants to meet the graver constitutional effects of sepsis.

The surgical treatment embraces curettage of the uterus and the posterior *cul-de-sac* incision with drainage in all cases where the infection has not produced distinct pus pockets, or the vaginal or abdominal removal of the inflamed organs. Far better ultimate results are obtained by conservative treatment of septic salpingitis than of gonorrhœal, and no matter how gravely ill the subject is, the conservative vaginal section is always preferable to the removal of any organs. In cases many times infected, in those relapsing after conservatism, and where the infection has produced a diffuse suppuration, a radical operation with free drainage is indicated.

#### Chronic Gonorrhœal and Septic Salpingitis (Fig. 12).

—Unless checked by surgical means gonorrhœal and septic salpingitis always leave the tube permanently damaged. A repetition of the infection may result in the production of much connective tissue, con-



FIG. 12.—CHRONIC GONORRHOËAL AND SEPTIC SALPINGITIS. CYSTIC OVARY.

stituting *pachysalpingitis*. Very rarely in gonorrhœa, often in sepsis, particularly staphylococcic, both ends of the tube will be occluded, and secretion continuing, there will be produced a clear cyst of retention, a *hydrosalpinx*. The most destructive lesion of the tube resulting from these infections is *pyosalpinx*. Then the



tubal walls form but the retaining membrane of a pus pocket. They are firm though perhaps thinned. The plicæ of the tube are obliterated, the lining being little more than a pyogenic membrane.

Coexisting with a pyosalpinx may be an ovarian abscess or diffuse pelvic suppuration. The precise differences both in lesions



FIG. 13.—PACHYSALPINGITIS, MULTIPLE PERITONEAL ADHESIONS, OVARIAN SCLEROSIS. It will be noted that the tubes have, by repeated infections, been converted into mere fibrous cords (Winckel).

and treatment vary according to whether the production of connective tissue or pus or simple fluid predominates.

*Pachysalpingitis* (Fig. 13).—The lumen of the tube is much diminished in size, is wholly obliterated or constricted in places. The tube is tortuous, bound by adhesions, is cord-like, and pale in colour. Usually there have been many attacks of endometritis

or repeated curettages. The menses are much diminished, and there is slight leucorrhœa. The pelvic pain is pretty constant, increasing before menstruation. There is no fever and the patients are usually well nourished. Dysmenorrhœa is severe, and sterility is always present when the condition is bilateral, the usual state.

The condition is very common in prostitutes. Upon examination the uterus is usually fixed high in the pelvis, is decreased in size, and the vaginal fornices are drawn to the cervix by cicatricial tissue. Occasionally the uterus is enlarged. The tubes are felt as cords extending from the cornua, and are sensitive upon pressure. The ovaries are rarely to be felt. There is a fixity about these uteri without evidences of effusion which is significant. The pain is produced by the connective tissue constricting the nerves. If the *cul-de-sac* is opened the dense character and inelasticity of the tissues are apparent. Many firm old bands are felt in the pelvis which are broken with difficulty. The tubes appear as firm, white,



FIG. 14.—HYDROSALPINX.

occluded, often knobbed cords, not pink, as in health, nor livid, as in acute salpingitis, nor brawny, as are pus tubes.

*Treatment.*—A cure is not to be effected except by removal. Ichthyol (10 per cent) may be injected into the vagina at bed-

time every other night by means of a straight "P-syringe," or a tampon soaked in the same solution may be applied over the cervix, to relieve pain. The lesions are permanent and progressive.

*Hydrosalpinx* (Fig. 14).—The cyst walls are very thin. There may be one large cyst, or the tube may be sacculated. The tube may vary from one but slightly above normal in size to one weigh-



FIG. 15.—TUBO-OVARIAN CYST.

Shows the opening in the tube communicating with the cyst of the ovary. The tubal cyst has been cut open.

ing many ounces. The contents are clear fluid, sometimes with flakes of desquamated epithelium. Occasionally a calculus is found in the fluid. If a hydrosalpinx communicates with the cavity of a simple follicular degeneration of the ovary it constitutes a *tubo-ovarian* cyst (Fig. 15). Hydrosalpinx is of slow formation and is produced by any condition which will close the fimbriated end of the tube. It will sometimes form in the stump left after an imperfectly performed salpingectomy.

The symptoms are not clear. The primary cause is an infection which is usually septic and mild. There are no attacks of repeated peritonitis. There is no fever. The pain is occasional. Rarely a tube will discharge into the uterus and the contents thus



escape. Upon examination a hydrosalpinx is felt as a very thin-walled cyst, distinctly pedunculate, and rather freely movable. They are not very sensitive, and are often ruptured during examination with no ill effect. Upon inspecting a hydrosalpinx through the vaginal incision its characteristics are remarked, the absence of all signs of acute inflammation, the perfectly smooth surface covered by endothelium, and the thin wall through which the fluid shows.

*Treatment.*—If the sacs are large they should be removed, the ovary being spared if possible. They may be removed either through the vagina or through the abdomen. If the tube is not distended beyond a diameter of an inch, the tube should not be sacrificed, but a salpingostomy should be done.

**Tubercular Salpingitis** (Fig. 16).—It is found in about 1 per cent of deaths from natural causes, and in 4 per cent of cases



FIG. 16. TUBERCULAR SALPINGITIS.

Shows both miliary tubercles and cheesy ulcerations.

dying of phthisis. It is most frequent between twenty and forty. The disease is usually bilateral. There may be scattered tubercles lying beneath the mucous membrane of the tube; or the tubercular process may extend to the muscular coat of the tube with extensive caseation, and perhaps the formation of a tubercular pyosalpinx; or there may be an extensive production of fibrous tissue between the tubercles, causing great distention of the tubal lumen. The second form is most common. Calcareous plates are sometimes found in the cheesy material. The type of this disease is very chronic, acute miliary tuberculosis of the tubes being exceedingly rare. Most cases are accompanied by a plastic peritonitis about the fimbriated ends of the tubes. Tuberculosis of the tubes is the most common form of

tuberculosis of the generative tract. About 10 per cent of all pyosalpinx cases show tubercles. The disease is very often accompanied by tubercular peritonitis; and tubercular tubes are found in about 35 per cent of all cases of tubercular peritonitis in women.

*Symptoms.*—They are those of a simple catarrhal salpingitis of very chronic type, or of a pyosalpinx which has formed very slowly and without the history of gonorrhœa or sepsis. The symptoms are always less acute than in other forms of salpingitis. Tubercular pyosalpinx is firmer and less sensitive than other forms. The morning temperature is often subnormal and that at night elevated, and the daily variations are very regular.

*Treatment.*—Merely evacuative incision of tubercular pyosalpinx often causes a systemic infection by the bacilli. It is therefore better in all cases to perform a radical operation either by the vagina or the abdomen. The latter route is preferable where the general peritonæum is involved, owing to the destructive effect of the abdominal section upon the bacilli in such cases.

*Pyosalpinx.*—This is a purulent cyst of retention, and should not be confounded with acute purulent salpingitis. The walls of the tube are hard and thinned, or they may be much thickened. Through them the yellowish pus within often shows. The vessels are dilated, and upon the tube flakes of lymph are seen, some of which have been converted into firm adhesions. The tube is broadest at the ampulla, where it is usually attached either to the ovary or the broad ligament, and at the cornu it is narrow and firm. Therefore a pyosalpinx is pedunculate. Sometimes the adjacent ovary is normal, but more often it, too, is inflamed. Upon section of one of these old pus-tubes the tubal plicæ may be present or obliterated, and the sole lining of the tube be a so-called *pyogenic membrane*. The pus filling them is in about a third of the cases sterile, but usually contains micro-organisms. The most common is the gonococcus. The tubercle bacillus is found in about 10 per cent of cases, and other organisms less frequently. The cavity of the tube may communicate with one in the ovary. Or there may be a fistulous tract between the pus-tube and the rectum, vagina, bladder, or appendix vermiformis, due to rupture of the pyosalpinx into either viscus. The tube may rupture into the mass of lymph effusion which forms in the pelvis, producing *diffuse suppuration* with its innumerable sinuses. Pyosalpinx may result from a salpingitis, be secondary to an appendicitis if on the right side, be secondary to a pelvic lymphangitis or ovaritis, or be due to suppuration in an ectopic sac. Patients with pyosalpinx may carry them for years with little impairment of health. These pus sacs are secure from trauma deep within the bony pelvis, and only

occasionally do they rupture. If the rupture takes place into the bowel, the most frequent point of evacuation, a sudden relief from symptoms is experienced, but relapse is usual by reinfection from the bowel. Or the rupture may occur into the vagina or bladder, and relapse be less likely. If a pus-tube ruptures into the free pelvic cavity (a rare occurrence), it is rapidly fatal unless an operation is done. As a rule, before intraperitoneal rupture can occur, dense masses of plastic material will have been effused about the weak point, and when rupture occurs the pus is kept locked in.

*Symptoms.*—There is the history of the primary infection, with subsequent relapses. Pretty constantly pain in the pelvis exists. Intercourse, exercise, and sudden body movements increase it. A few days before menstruation the pain begins to increase, but diminishes when the flow is established. The pain is of a dull character, radiating through the back and down the thigh. Before menstruation it may become of a stabbing character. The menses are increased in amount. A purulent leucorrhœa is present. The patient is sterile. Menstruation may remain regular, but more often irregular bleedings occur. These are due to the irritating presence of adhesions, which keep the uterus enlarged. There is also usually an increase in the amount of menstrual blood, and this is apt to clot. Recurrent attacks of inflammation are usual, and relapse occurs soon after the first attack. The evening temperature is elevated and the pulse accelerated in most cases. Leucocytosis is present. The cause of these relapses is probably the escape of pus or the migration of germs from the abscess.

Upon examination there is felt in one or the other lateral vaginal fornix a fixed sensitive mass posterior to the broad ligament, and having a distinct sulcus between it and the uterus. Or the mass may be behind the uterus. It feels to the finger like a thick-walled sac filled with fluid. The uterus also is fixed, and may be displaced if the pus sac be large. Upon abdominal exploration, the intestines which mask the sac must be released and held back. This is not necessary in vaginal exploration. The finger is passed along the posterior surface of the uterus, then laterally, and in this way the contour, size, and attachments of the sac are determined. On inspection the discoloured sac shows bleeding points where adhesions were severed, and bits of lymph adhere to it.

*Diagnosis.*—First there is the history of the infection. A suppurating ovarian cyst is usually much larger than a pyosalpinx,

and is unilateral. It is usually infected from above, not from below by gonorrhœa or by infecting trauma to the uterus. An ectopic sac is harder than a pyosalpinx, the subjective symptoms are different, there is no fever, etc. A broad-ligament cyst or abscess is always sessile upon the uterus, and occupies a position anterior as well as posterior to the normal plane of the broad ligament. Appendicitis may coexist with pyosalpinx and will mask its symptoms. Appendicular pain is abdominal, and radiates upward towards the xiphoid; pyosalpinx pain radiates downward. In appendicitis the greatest sensitiveness is upon abdominal pressure over the appendix; in pyosalpinx vaginal examination develops the greatest sensitiveness. In appendicitis muscular rigidity over the appendix is marked; it is absent in pyosalpinx. Intraperitoneal hæmatoma presents none of the subjective symptoms of inflammation until it becomes infected. Tubercular tubal disease cannot be differentiated except by the history. Tubercular salpingitis is usually of very slow formation, except when occurring post partum, does not present the acute symptoms which attend tubal inflammation from other causes, and is not accompanied by the purulent leucorrhœa attending gonorrhœal salpingitis. Very often the examination of the specimen after removal will alone differentiate.

*Treatment.*—The existence of pyosalpinx requires a surgical operation. This may be either a vaginal evacuation or an abdominal removal. A single pyosalpinx cannot be satisfactorily removed through the vagina. If the disease be bilateral, either a vaginal ablation or abdominal removal may be performed. If the patient be very much reduced, the pus should be evacuated *per vaginam*, and the strength improved before she undergoes a severe operation. If the history shows that the pus has discharged into the rectum, vaginal incisions should be made and the rectum kept open so as to facilitate the closure of the fistula before doing the operation of removal of the sac. As a rule, such cases call for the radical vaginal operation rather than laparotomy. In treating these cases, it must be remembered that surgical rules govern here as elsewhere, and that SUPPURATION IN A PREFORMED SAC IS CURED EITHER BY REMOVAL OF THE SAC OR ITS OBLITERATION.

*Prognosis.*—The pus may become cheesy and remain quiescent. Usually, however, a condition of chronic invalidism is induced, leading to nephritis and phthisis. Pus sacs which rupture into the bowel often produce profound septicæmia from passage of the



bowel contents into the tube. These and the cases of diffuse suppuration are the gravest. The peritonitis accompanying the suppuration interferes with the bowel and bladder functions.

### INFLAMMATIONS OF THE OVARIES

**Acute Oophoritis.**—Any agent which produces peritonitis adjacent to the ovary may also cause an inflammation of the peritoneal covering of the ovary. We therefore find the condition frequently associated with septic endometritis, salpingitis, pelvic peritonitis, or on the right side with appendicitis, and it also occurs as a



FIG. 17.—ACUTE SALPINGITIS, CHRONIC SALPINGITIS, ACUTE OOPHORITIS, ACUTE PELVIC PERITONITIS. VAGINAL ABLATION BY HEMISECTION.

complication of the eruptive fevers. If the peritonæum only is involved it is known as *peri-oophoritis* (Fig. 17). There is an effusion of lymph over the ovary which may bind it to any adjacent organ, most frequently the broad ligament or tube. The ovary is swollen and œdematous. The lymph may break down into pus or become organized into bands or sheets of adhesions which constrict or conceal the ovary. As a result of the inflammation the capsule of the ovary becomes thickened. If the inflammation extends to the stroma of the ovary the organ becomes much swollen and œdematous from serous and cellular infiltration. The inflammation and the accompanying congestion may be so intense as to produce hæmorrhages into the stroma, constituting *ovarian apoplexy*; or into one or more of the Graafian follicles, forming an *ovarian hæmatoma* (Fig. 18). The lymphatics of the



ovary may be chiefly involved, producing great œdema, softening, and enlargement, and constituting the condition known as *œdematous ovaritis*. The type of infection brought to the ovary by the lymphatics may be so virulent as to cause suppuration in the ovarian stroma, or *ovarian abscess* (Fig. 19). Sometimes there are a great number of pus foci, or there may be one large abscess. In certain cases no pus is produced but the inflammation subsides, the Graafian follicles become distended, and appear beneath the surface of the ovary as pearl-like bodies, forming the condition of *cystic degeneration*. Cystic ovaries are enlarged, or a portion of an ovary may be cystic and the rest shrunk. The production of connective tissue may be so great as to cause marked atrophy of the organ, it being converted into a mere mass of shriveled connective tissue—*sclerosis*. The ovary may also be acutely inflamed in



FIG. 18.—HEMORRHAGES INTO THE GRAAFIAN FOLLICLES.



FIG. 19.—LARGE OVARIAN ABSCESS.

It has been aspirated and its walls have collapsed.

a curious association with contagious parotitis, and the organ ultimately become atrophied. Suppuration in the ovary is caused by

any of the pyogenic bacteria. Sometimes cystic accumulations become calcareous (Fig. 20).

*Symptoms.*—In youth the ovary is pink and has a thin capsule. After hundreds of ovules have ruptured the organ becomes scarred and pale, the capsule is thickened, and the ovary distorted. No two ovaries are exactly alike, and there is a very great variety among perfectly normal ovaries. There is no standard of gross

appearance to guide the surgeon in his operations upon the ovaries. Few symptoms are produced by ovarian inflammations which are not easily referable to associated diseases.

*Peri-oophoritis* furnishes no distinguishing symptom, as it is always accompanied by some graver lesion, as salpingitis or pelvic peritonitis.



FIG. 20.—“STONE IN THE OVARY.”

Calcareous degeneration of the contents of an ovarian hæmatoma.

*Ovarian hæmatoma* occurring suddenly may cause so rapid a distention of the ovary with severe pain located in one side as to closely simulate an ectopic gestation. Smaller accumulations of blood in the ovary and *cystic degeneration* produce localized pain,

which is increased a few days before menstruation—that is, at the time of ovulation.

*Atrophied* ovaries produce no symptoms which are recognisable as due to that condition.

*Ovarian abscess* cannot be differentiated from pyosalpinx. The history will presumptively indicate the character of the abscess. Ovarian abscess is most often found due to sepsis after abortion or labour, and when due to gonorrhœa is commonly secondary to pyosalpinx. Upon examination there is felt to one side of the uterus or behind the broad ligament a dense adherent mass which is pedunculate, sensitive, and not fluctuating unless large. It is indistinguishable from a pyosalpinx, with which it is often associated.

Usually there is fever, pain, etc., just as in pyosalpinx; but in certain old cases the pus becomes sterile, and no toxins being produced, there may be no fever. The pus from ovarian abscess is notably virulent, owing to its being so frequently caused by streptococci.



*Treatment.*—The treatment of *peri-oophoritis* is merely that of the accompanying peritonitis. The palliative treatment comprises the application of 10 per cent ichthyol to the vaginal vault, saline purges, and perfect rest in bed. The operative treatment consists in freeing the organ from all false attachments by vaginal section, and draining the pelvis with iodoform gauze.

*Ovarian sclerosis* is incurable by any means short of removal. BUT AS THE SYMPTOMS PRODUCED BY SUCH A CONDITION ARE SO LITTLE UNDERSTOOD, SCLEROSED OVARIES SHOULD NEVER BE REMOVED UNLESS THE UTERUS ALSO NEEDS TO BE SACRIFICED.

*Edematous oophoritis* usually occurs under circumstances which require removal of the Fallopian tubes. Should it be found to exist alone—an exceedingly rare circumstance—the ovaries are not to be removed, as involution is probable; but the periphery of the ovary should be punctured in several places to reduce the swelling.

*Cystic Ovaries.*—The condition being characterized by essential anatomical changes, medical treatment is without effect. Either through the posterior *cul-de-sac* or the abdomen the cysts, if few, should be punctured. If the cyst-bearing area is large that portion of the ovary is to be resected. If the entire organ seems disintegrated and the degree of suffering is such as to warrant removal this must be done.

*Ovarian Hæmatoma* (Fig. 18).

—This never calls for removal of the organ. The involved portion of the ovary is to be resected. If old, these blood cavities are lined by a distinct membrane. After incising the capsule of the cavity and carefully catching the escaping blood so as not to soil the peritonæum, the lining is peeled out. The loose flaps left are trimmed before suturing is done.

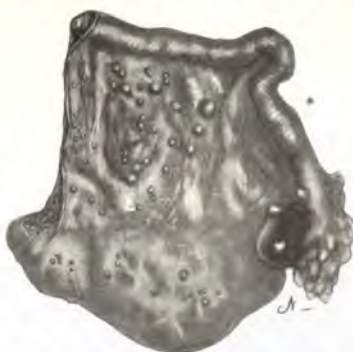


FIG. 21.—TUBERCULAR OVARITIS.

*Ovarian abscess* is treated in a manner similar to pyosalpinx, both as regards palliative and radical operations.

**Tubercular Ovaritis** (Fig. 21).—This is never found as a primary disease. It is always secondary, usually to tubercular peri-

tonitis or salpingitis. It occurs as miliary infiltration or as cheesy deposits due to the former. The disease may remain tubercular or the deposits may break down, producing ovarian abscess. The disease is more frequently limited to the peritonæum of the organ. Finally, any lesion of the ovary, inflammatory or neoplastic, may become tubercular.

*Symptoms.*—There are no symptoms to distinguish tubercular ovarian disease from any other infection of the organ except the chronicity of the disease, its painlessness, and slight rhythmical variations in temperature.

*Treatment.*—The condition is always discovered accidentally during the performance of an intraperitoneal operation. It calls for the removal of the involved organ.

**Broad-Ligament Abscess.**—Suppuration between the folds of the broad ligament was formerly much more common than nowadays. In the second 1,000 of my clinic cases I have seen but 6. The condition is due to a septic pelvic lymphangitis. The lymphatics in the folds of the broad ligaments suppurate as a result of an infection coming from within a uterus which has recently been subjected to operation or abortion or labour; or it may result from a broad-ligament hæmatocele which has sprung from a ruptured ectopic gestation; or from a post-operative broad-ligament clot becoming infected. As a rule, the streptococcus pyogenes is the causative germ. As the pus forms it separates the folds of the broad ligament, the bulging being chiefly of the posterior layer, as the bladder in front prevents much distention anteriorly. As the abscess increases the peritonæum is stripped from the posterior lower segment of the uterus, and it may lift the peritonæum from the rectum. In front it may dissect the peritonæum and bladder from the cervix, and in very large abscesses the peritonæum may be lifted from the pelvic bones in front and be felt at Poupert's ligament. If the lesion is bilateral the cavities may even connect in front of the cervix. The suppuration is essentially extraperitoneal. There is always more or less peritonitis present. It is suppuration in continuity of tissue, as distinguished from that in a preformed sac, like the Fallopian tube. As the abscess reaches a large size it is presented as a fluid accumulation lying on the pelvic floor, pushing the uterus to one side, and above which lie the omentum and intestines usually adherent to the growth. Although the suppuration may be virulent, yet it is often found that the



ovaries and tubes are not involved. And, on the contrary, Fallopian and ovarian suppuration may coexist.

*Symptoms.*—After an attack of pelvic inflammation, which is usually preceded by an abortion or labour, rigors and violent fluctuations in temperature may occur. Upon examination the uterus is found displaced, usually upward and to one side. It is sometimes lifted so high that the cervix cannot be felt. Extending from the side of the uterus to the lateral pelvic wall is a dense fluctuating mass immovably fixed to the uterus and presenting no sulcus between the uterus and the mass; the growth is *sessile* upon the uterus. With large abscesses the rectum is partially obstructed and the bladder incapable of any considerable distention. Upon opening the posterior *cul-de-sac* the finger will readily appreciate the bulging posterior wall of the broad ligament if the abscess be of moderate size; but if it has lifted the peritonæum from the rectum the exploring finger will at once enter the abscess without penetrating the peritonæum.

*Treatment.*—If the abscess be small the attempt should be made to evacuate the pus from between the folds of the broad ligament by an incision under the abscess from the side of the cervix, so that the finger will not open the peritonæum. The abscess cavity is then packed with iodoform gauze. But if the abscess be large the incision is to be made in the posterior *cul-de-sac* and the pus sought by means of the finger only. These cavities should not be irrigated lest the septic material be washed into the pelvic cavity through an opening accidentally made. When the abscess is very large it usually presents as an elevation just above Poupart's ligament over which the skin is oedematous or glistening. It usually presents here before it raises the peritonæum of the rectum and pelvic floor, and hence can easily be opened above Poupart's ligament by a strictly extraperitoneal incision. Such an abscess must be carefully washed out daily through double drainage-tubes. They close very rapidly. This condition calls for a radical operation only when bilateral tubal disease coexists, a condition not common with small broad-ligament abscesses. When tubal and ovarian suppuration is thought to coexist, the peritonæum may be entered by the vagina and a careful examination made after the abscess is opened and its contents evacuated. In all cases where both the abscess and pelvic cavities have been entered, they must be drained by large quantities of gauze. Or an



abdominal section be performed, and if the abscess be broken into, either an abdominal or vaginal drain introduced. But laparotomy in cases of broad-ligament abscess gives a very high mortality.

**Diffuse Pelvic Suppuration.**—Suppuration has occurred in tubes, ovaries, or broad ligaments, one or all, but has ceased to be confined to the original point of origin. The pus has escaped between the adherent organs and has burrowed between the planes of plastic lymph which has been effused, or has broken through into the cavity of a hollow viscus. The condition is essentially of a chronic nature, and is not to be confounded with primary purulent peritonitis, which is always acute. The infection is usually of a mixed type. Cases thus afflicted are of the gravest nature.

*Symptoms.*—The chronicity is marked. There is a history of weeks or months of suffering, recurrent chills, hectic, repeated acute exacerbations as the pus escapes into a new area of tissue; and usually the patient is bedridden.

The uterus, ovaries, tubes, and pelvic cellular tissue are matted into a conglomerate mass in which with difficulty the organs can be distinguished from each other. The vaginal vault is dense and unyielding. The uterus is immovably fixed. Commonly the posterior fornix bulges down into the vagina, and this swelling may fluctuate or be of fibroid hardness. The abdomen is permanently tympanitic. The bowels are very irregular in function, costiveness alternating with diarrhœa, and the bladder is incapable of fully contracting, being held by adhesions, hence cystitis is a common accompaniment. The temperature is steadily elevated, there being evening and morning fluctuations. Phthisis and nephritis are frequent complications, the latter rarely being absent. The rectum is canalized; it cannot contract. The patient suffers great pain not only in the special organs and abdomen, but also in hips and thighs from pressure on the nerves. The pus may escape into bowel, bladder, or vagina, or open above Poupart's ligament. There are dysmenorrhœa, menorrhagia, and often metrorrhagia present. Frequent douching is necessary to wash away the large quantities of yellowish or greenish pus that escape from the uterus. The tongue is dry, furred, and red. The appearance of the patient is that of one profoundly septic or of one suffering from typhoid fever. The pulse is rapid and feeble. Repeated rigors are common. Death ensues from nephritis or pneumonia or sheer exhaustion.

Upon examination we find the absolute fixity of the uterus, a density anterior to the cervix not found except with broad-ligament abscess, fluctuating masses either posterior to the uterus or at the side, and a degree of involvement of the pelvic organs from which none seems to escape.

The condition cannot always be distinguished from fibroid with suppuration. Leucocytosis is exaggerated, the hæmoglobin reduced, the spleen is not enlarged, and the blood does not give the Widal reaction, phenomena which will eliminate typhoid fever. The leucocytosis as well as the history will suffice to differentiate the disease from pelvic hæmatocele due to ruptured ectopic gestation.

*Treatment.*—A cure is to be effected in the milder cases only by a radical operation. This may be done either by the abdomen or vagina, preferably the latter. But in the graver cases a radical operation is positively contra-indicated owing to the danger. In these the surgeon should rapidly incise the posterior vaginal fornix and enter the pelvis with his finger. He should search for and empty all pus pockets. These are then packed with iodoform gauze.

After the local and general condition has improved a radical operation may be performed.

## CHAPTER III

### *DISTORTIONS AND DISPLACEMENTS*

It is necessary to a proper understanding of pathological positions of the uterus that the normal range of mobility of the organ be fully appreciated (Fig. 22).

This is much more considerable than many admit. If the bladder becomes distended, as its enlargement proceeds the uterus



FIG. 22.—THE NORMAL RELATIONS OF THE PELVIC ORGANS SEEN IN MESIAL SAGITTAL SECTION (Deaver).

is not only forced backward but is lifted up (Fig. 23). This distention may be so great as to force the uterus against the

sacrum; yet when the bladder is emptied the uterus will return to its normal position. In overdistention of the rectum the uterus is forced upward and forward (Fig. 24). When the woman is in a squatting position and straining down the uterus may be displaced downward but slightly in a normal pelvis. Under such effort the organ sinks a little lower and becomes more anteverted. If retroflexed, this is exaggerated.

The contents of the pelvis are semifluid and of nearly equal consistence. The pelvis is closed below by the perineal muscles and its floor has but little mobility. Above, the abdominal muscles form a fairly rigid case for the abdominal viscera, and the diaphragm closes the cavity at the top. But

the diaphragm is in continuous rhythmical movement in the act of breathing, and as it contracts it would increase the intra-abdominal pressure were it not for the fact that this pressure is kept uniform by the synchronous relaxation of the abdominal parietes. THE INTRA-ABDOMINAL PRESSURE IS UNIFORM UNDER ORDINARY CIRCUMSTANCES.

This pressure bears as well upon the under, anterior, and posterior surfaces of the uterus as upon the superior, and it is the knowledge of this equilibrium of semifluid contents in a closed cavity which explains the support of the uterus. The perinæum does not accomplish this other than it maintains closure of the bottom of the cavity. The ligaments play no part in maintain-

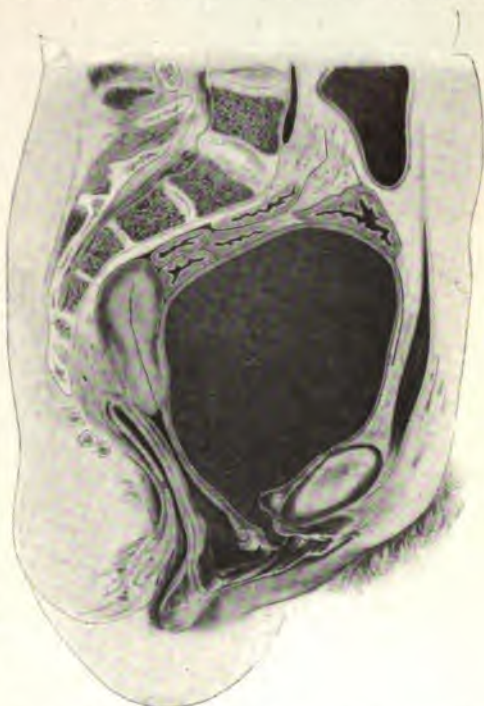


FIG. 23.—FORCIBLE DISTENTION OF THE BLADDER DISPLACING THE UTERUS BACKWARD (Pirogoff).



ing the uterus in position until their uterine attachments are rendered tense by displacement of the uterus; they are operative only when a certain degree of displacement occurs. When the pelvic floor is torn, the uterus tends to descend, not because any support of the organ is severed, but because the equilibrium of the intra-abdominal pressure is disturbed and the pressure becomes greatest from above. Descent of the organ results. It will be noticed that antero-posterior section of the pelvis shows the vagina to be a mere slit with coapted walls.



FIG. 24.—FORCIBLE DISTENTION OF THE RECTUM DISPLACING THE UTERUS UPWARD AND FORWARD (Pirogoff).

The rectum is open, filled with feces or gas, but is practically closed, for its end is held tightly shut by the sphincter ani. An explanation of why, when this sphincter is relaxed in defecation, the uterus does not descend is offered. The true pelvic diaphragm is the levator ani muscle. It surrounds the vagina and the rectum, being attached to the sphincter ani of the latter. It may therefore be termed the opposing muscle of the sphincter. Under the stimulus of the descend-

ing column of feces the levator ani contracts, and tends to pull apart the relaxed sphincter. At the same time it tightly closes the vagina. The rectum is filled with the fecal column, which lies posterior to and below the uterus. This column escapes in obedience to intestinal peristalsis and increased intra-abdominal pressure. The equilibrium of this pressure is not disturbed in the act of defecation, there being a perfect



correlation in forces, and the position of the uterus is not changed.

But if the vagina is torn so that air enters it, or the tone of the abdominal muscles be damaged by overdistention, paralysis, or other cause, the equilibrium of the intra-abdominal pressure is disturbed, and the uterus must be supported by its anatomical attachments. As the levator ani constitutes the important part of the perineal body, and is torn when the perinæum is ruptured, it cannot close the vaginal slit or pull apart the sphincter during defecation. As the column of fæces descends it meets the obstruction of a partially closed sphincter, and the equilibrium of the intra-abdominal pressure is disturbed, in that the floor of the cavity is more relaxed than its sides and top. As a result the uterus sinks down, the fæcal column pushes forward toward the unresisting vagina, rectocele is produced; and retroversion induced through traction on the posterior vaginal wall, together with the downward tendency of the intra-abdominal pressure.

The behaviour of the uterus under the influences of posture is detailed in the article on Examination.

**Anteversion.**—In childhood the uterus lies upon the bladder without either irritating the latter or embarrassing it in its function. Pathological anteversion does not exist as a primary disease. To be of degree sufficient to be called pathological it must be forced there by tumours. The symptoms and treatment of this displacement are those of the causative disease.

**Anteflexion.**—This very common distortion of the uterus presents several varieties with important distinctions. The exact angle of flexure which is pathological is not to be expressed in degrees. A rather sharp bend may in one patient be accompanied by no departure from the normal in either function or symptoms, while a less degree in another woman may be associated with sterility and a severe type of dysmenorrhœa. This observation, together with many other disjointed facts, have convinced me that the flexure is but a greater or less prominent sign of a general disturbance in the uterus. Still, we are not prepared yet to change our exposition of the subject. There are two chief types of anteflexion.

**Simple Anteflexion** (Fig. 25).—The cervix occupies a relatively high position in the pelvis, owing to a rigidity and shortening in the utero-sacral ligaments. The axis of the cervix is at

the proper angle with that of the vagina, the cervix is not hypertrophied, the external os is round, but the cervix otherwise normal. The body of the uterus is sharply bent upon the cervix at or near the internal os. The point of flexure becomes changed, the anterior wall thickened, and the posterior much thinned. In some cases the body of the uterus is normal in size, in others it is much reduced. The endometrium becomes atrophic, and its lymphoid tissue less abundantly supplied with cells. The cervix being fixed, as the woman stands the intra-abdominal pressure falls upon

the posterior surface of the organ, and the flexure is increased.



FIG. 25.—SIMPLE ANTEFLEXION.

The uterus is high in the pelvis, the cervix but little enlarged, and its axis in proper relation to that of the vagina, and the body of the uterus is sharply bent forward.

*Symptoms.*—These patients are usually well-nourished. Menstruation is regular, occurring every four weeks. It lasts from one to four days, rarely longer, and is caught by from four to eight napkins. The flow is clotted. A few hours before noticing the flow a sense of weight in the pelvis comes on. This is speedily followed by pain in the uterus referred to a point just behind the pubis. This pain is intermittent and cramp-like or it may be

continuous with spasmodic exacerbations. After the flow appears some relief is experienced. The flow gradually becomes watery and the pain decreases. Coincident with the pain is often a manifestation of hysteria. Some patients vomit, some have diarrhoea, and occasionally hystero-epileptic seizures occur. After the flow ceases, a whitish, unirritating leucorrhœa supervenes and lasts a few days.

Upon digital examination the cervix is found high in the pelvis. If the finger is passed anterior to the cervix and between it and the bladder, the rounded form of the uterine body will be felt.



Viewed through the speculum, the external os is usually seen to be round, instead of being a normal slit. Occasionally, usually in anæmic women, a slight cervical folliculitis is present. The plug of mucus in the cervix is clear. If the sound is passed, an entirely unnecessary act, as a rule, it should be sharply curved, and not introduced until the cervix has been pulled down by bullet forceps, so as to straighten the uterus somewhat. At the internal os the sound will usually develop an exquisitely sensitive point. Vaginitis and dyspareunia are common results of this form of flexure.

The cause of the *dysmenorrhœa* is commonly attributed to the formation of clots within the uterus. This, I believe, is an error. In many cases of the most severe type which I have been compelled to treat during the menses, no clots have been found. The clotting occurs most often in the vagina. The blood clots because of the small amount of lymphoid elements contained in it. Normally, for some days preceding menstruation, the endometrium becomes thickened owing to congestion. This is accompanied by an enormous multiplication in the lymphoid cells. These increase to such an extent that the epithelium is literally forced off the surface of the endometrium and from some of the glands, and blood and lymphoid elements are extruded.

Softening of the endometrium due to the multiplication of lymphoid elements is the way in which menstruation normally approaches; but in this form of flexure due to changes in the endometrium, few lymphoid elements are produced, the menstrual congestion has no relief in softening, and as a result pain is produced. It is the abnormal way in which the blood-pressure takes place which causes pain, and the blood clots because of scarcity of lymphoid cells.

*Treatment.*—These being my views, I seek to modify the life of the girl so that the *dysmenorrhœa* will not occur.

Enough has been said regarding the influence of systemic changes upon the lymphoid endometrium to afford an explanation of the benefit which is often seen to follow a change of climate, etc., in these cases of anteflexion with *dysmenorrhœa*. Regulation of the diet will also tend to reduce the amount of pain accompanying menstruation. Many of these girls are plethoric, and have high arterial tension. In such cases it is my habit to put them on a dietary for ten days before an expected menstruation. They are denied all red meats, sweets, spiced food, and rich dishes. They

are given an abundance of fish, fowl, starches, fruit, and fresh vegetables. Each morning a light dose of aperient water, sufficient to produce one watery stool, is given. When the period occurs, they are made to lie down. If the cramps are so severe as to demand treatment, a capsule containing  $\frac{1}{2}$  grain codeine and 3 grains phenacetine will relieve; BUT THE EFFECT OF THE ADMINISTRATION OF AN OPIUM DERIVATIVE IN A PAINFUL AFFECTION OF REGULAR RECURRENCE MUST NOT BE FORGOTTEN; a habit is too easily established. A far better preparation is the following: Ext. gelsemii fld.  $\mathfrak{M}$  3, with tr. hyoscyami  $\mathfrak{M}$  30, if the nervous phenomena are marked, or with tr. cannabis Indic.  $\mathfrak{M}$  20 instead of the hyoscyamus if the flow is increased. Upon taking any of these remedies the patient should lie down, with clothing loosened, and exciting company prohibited.

The dysmenorrhœa may be rendered less by a dilatation of the cervix practised about a week before menstruation.

But, inasmuch as the pain, sterility, and other symptoms are due more to the unnatural character of the endometrium than to the flexure, the indicated operative procedure is curettage with the sharp curette, thus removing the entire endometrium. In order that the new endometrium which forms after such a procedure may develop in the absence of circulatory stasis and cervical stenosis, the curettage is to be accompanied by bilateral incisions of the cervix and thorough dilatation of the cervical canal (Fig. 72). The various serious operations which seek to correct the flexure, such as laparotomy and resection of the posterior uterine wall at the seat of the bend, are to be condemned. The sole influence which can permanently so change one of these congenitally distorted uteri is pregnancy and labour at full term. But the bilateral incision, dilatation, and aseptic curettage will grant in many cases an immunity from severe dysmenorrhœa.

**Anteflexion with Retroversion** (Fig. 26).—This is the “anteflexion with long conical cervix” of Marion Sims, or anteflexion with hypertrophy of the cervix as described by others. The uterus is low in the pelvis. The cervix is long and conical, the anterior wall being shorter than the posterior. The axis of the cervix is that of the vagina. The cervix is bent forward upon the body of the uterus and the latter is thrown backward somewhat, so that it occupies a plane posterior to the normal of some 15 to 45 degrees.



The cause of this peculiar condition is unknown. The cervical hypertrophy may be so great that the organ projects from the vulva, but the degree of flexure between cervix and corpus uteri is not changed by the amount of cervical hypertrophy.

*Symptoms.*—The symptoms are similar to those of simple ante-flexion. Women possessing the form of ante-flexion under discussion usually flow more and suffer less than those with simple ante-flexion. Back-ache and pelvic tenesmus are more common than in simple ante-flexion, and the ovaries have a tendency to become swollen and cystic, due to obstructed venous circulation in the broad ligaments. Leucorrhœa is present and more profuse than in the first class. There are no prominent differential symptoms. Upon examination the local condition is most readily ascertained. The cervical hypertrophy accompanying ante-flexion differs prominently from infra-vaginal cervical hypertrophy in that there is a marked difference in the enlargement of the two lips of the cervix in ante-flexion. The speculum reveals the long conical cervix with its apex dimpled by the round external orifice. The sound will show that before it is turned to enter the cavity of the uterus it will pass through a cervical canal often 2 inches in length.

*Treatment.*—The medical treatment of these cases is the same as that of simple ante-flexion. The surgical treatment embraces two procedures—the operation of E. C. Dudley, and the author's modification of Sims's procedure. The indications to be filled by all operations are: removal of the hypertrophied cervix, removal



FIG. 26.—ANTEFLEXION WITH RETROVERSION.

The uterus is low in the pelvis; the cervix is elongated, its two lips being unequally developed; the cervical axis is that of the vagina, and the body of the uterus occupies a plane posterior to that which is normal. The shaded portion shows the extent of the incisions in Sims's operation.

of the diseased endometrium, and straightening of the cervical canal. If the cervical hypertrophy be less than an inch on the anterior lip, the modified Sims's operation will suffice to cure. But if the hypertrophy of the anterior lip be over  $1\frac{1}{2}$  inch, Dudley's operation or conical amputation is preferable.

**Retroversion and Retroflexion.**—The former designates a turning backward of the uterus so that the cervical canal faces towards the anterior wall of the vagina, and the latter a backward flexure of the body of the uterus upon the cervix. Congenital backward displacements of the uterus are exceedingly rare, I having seen but 3 instances in 4,000 clinic cases. These lesions are usually acquired. Any agent which causes a marked enlargement, or enlargement with softening of the uterus for some time, will conduce to a backward displacement. This is particularly true if at the same time the pelvic floor be torn. We see most of these cases occurring after abortion or labour. The next most frequent cause is infection of the uterus. Standing for hours during the menstrual days, particularly if associated with manual labour, will also produce it. It may occur acutely as the result of lifting heavy weights, or be produced by crushing in the abdomen as by a cart-wheel. The two conditions usually coexist in the same individual. A retrodisplacement of the uterus is any position of the uterus posterior to the normal, but does not always constitute a diseased state. As has been shown, overdistention of the bladder may force the uterus backward, yet this is not pathological retroversion. When the axis of the uterus is that of the vagina the displacement is that of the first degree; when it is so far posterior as to be to the vaginal axis about 90 degrees, it constitutes the second degree, and all displacements below this are of the third degree. This classification is purely arbitrary, and is only used to facilitate description.

So soon as the uterus assumes the first degree, it is so placed that it bears the intra-abdominal pressure on its anterior face, and the tendency is for the displacement to increase.

The retrodisplaced uterus is usually enlarged. The normal uterine secretion is retained because of the position of the organ, and is apt to undergo putrefactive changes, thus setting up an inflammation of the endometrium. The position of the uterus necessitates torsion of the broad ligaments, and as a result the venous plexuses become varicose, producing a form of chronic con-

gestion of the uterus. The endometrium is thickened. The uterus may rest upon the rectum and cause an exfoliation of the rectal peritonæum with slow formation of adhesions between the uterus and rectum. The lumen of the rectum is obstructed with resulting constipation and hæmorrhoids. If the displacement is accompanied by salpingitis or peritonitis, the various adnexal lesions may be associated with the adherent displaced uterus. If the inflamed uterus and peritonæum have formed high attachments to the bowels, these will be displaced down into the pelvis as the retrodisplacement occurs. Very many cases of this displacement are due to the influence of uterine neoplasms.

*Symptoms.*—My view is that not so much the displacement as the accompanying or causative lesions produce the symptoms. Backache is the most common symptom. It is exceedingly annoying, is constant, often severe enough to make an invalid of the woman, and is referred to the sacral region. Pelvic tenesmus, or "bearing down," is constant when the patient stands. There is often a dull aching pain in the region of each ovary due to varicose veins in the broad ligaments. This also induces a great weariness in the muscles of the legs, so that walking becomes most disagreeable. If the displacement be of more than the first degree, it drags on the bladder and produces irritability there. Dysmenorrhœa is common. As most of these cases are found in parous women in whom there is no cervical stenosis, the theory that obstruction to the menstrual flow produces the pain is untenable. Furthermore, the blood seldom clots in these cases. The menses are increased in amount and leucorrhœa is present. There are certain reflexes commonly present in these women. They are particularly irritable, and unreasonably so. They lose their self-control easily. A very characteristic occipital headache and pain in the nucha are very often present. As menstruation approaches, these two last symptoms increase until they often become unbearable. The inability to take exercise induces anorexia and disturbed digestion. Hence, pallor, loss of weight, tympanites, etc., are produced. The patient lies down a great deal, because in this position the pelvic congestion is lessened and the symptoms ameliorated. If the uterus be fixed in retrodisplacement it is very generally accompanied by some symptoms of adnexal disease, and the patient will usually seek relief from these rather than from symptoms due to the displacement.



Upon examination, a relaxed and possibly torn pelvic floor is usually found. Vaginal examination shows the cervix facing downward in the vaginal axis, or forward. The finger passed anterior to

the cervix fails to find the body of the uterus in its normal position, and upon passing the examining finger behind the cervix it will appreciate the presence of a body the shape of the uterus whose tissues are directly continuous with the cervix, and which moves with the cervix.



FIG. 27.—RETROFLEXION AND RETROVERSION OF THE UTERUS.  
FIRST STEP IN BIMANUAL REPLACEMENT.

The degree of sensitiveness is in proportion to the amount of metritis or adnexal disease present. Prolapse of the ovaries is very frequent, and they can be easily palpated low down behind the broad ligaments.

*Treatment.* — Immediately upon finding a retrodisplacement its fixity or mobility must be determined, and the presence or absence of adnexal disease proved. This is best done by attempting to replace the organ. The preferable method is the bimanual.

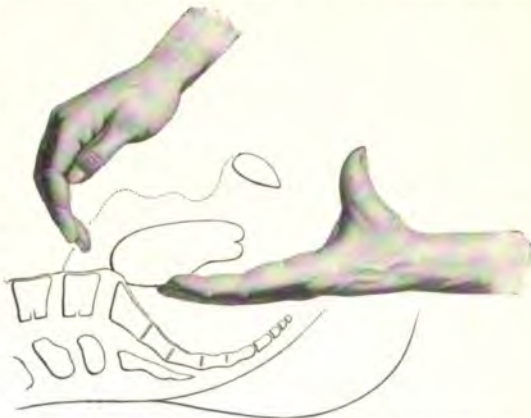


FIG. 28.—SECOND STEP IN BIMANUAL REPLACEMENT.

In *bimanual reposition* the patient is in the lithotomy posture, with the hips elevated so as to relax the abdominal muscles. The clothing is loose (Fig. 27). One finger, or two, is introduced into



the vagina, and guides a bullet forceps which is hooked into the anterior lip of the cervix. The cervix is drawn down and drags the fundus uteri away from the sacrum. The other hand is then crowded down on the abdomen until its fingers rest in the hollow of the sacrum behind the fundus (Fig. 28). The vaginal finger now pushes the fundus up so that it lies well in front of the abdominal fingers (Fig. 29).



FIG. 29.—THIRD STEP IN BIMANUAL REPLACEMENT.

(Fig. 29). When it is felt that these latter are well behind and somewhat beneath the fundus, the bullet forceps is removed and

the vaginal finger is used to shove the cervix upward and backward as far as possible, while the abdominal hand pulls the fundus forward (Fig. 30). The final step is to lift the cervix upward and hold it there while a pessary or dressings are applied to the vagina to prevent descent of the uterus.



FIG. 30.—LAST STEP IN BIMANUAL REPLACEMENT.

ALL PROCEDURES WHICH ARE EMPLOYED TO REPLACE

THE RETROPOSED UTERUS MUST PROCEED IN ONE OF TWO WAYS: THEY EITHER SHOVE THE CERVIX HIGH AND BACK, OR ELSE PULL THE BODY OF THE UTERUS HIGH AND FORWARD. The bimanual method accomplishes the replacement by both acts.

Some women are too stout, or have sensitive abdominal muscles, or have inflamed pelvic organs, so that this method is not feasible. It may then be tried under general narcosis; or the uterus may be replaced in the knee-chest position by a knobbed repositor, or in Sims's position by means of an intra-uterine repositor.

*Replacement in the knee-chest posture* is accomplished by lifting the perinæum with a speculum so that the vagina balloons with air. The repositor—a ball of cotton held in blunt dressing forceps—is then employed to lift the body of the uterus upward, and after it has passed the promontory of the sacrum, to push the cervix backward. This method is applicable in cases even when the uterus and adnexa are somewhat inflamed but the uterus movable.

In replacing the uterus by *Sims's instrument* the patient lies relaxed in Sims's position. The stem of the closed repositor is then introduced into the cervical canal, but not through the internal os, and the instrument is unlocked. The cervix is next shoved high and back towards the sacral promontory; the fundus falls forward if free, being dragged anteriorly by the empty bladder as the cervix proceeds backward. This is the easiest and simplest method of replacing the uterus, but necessitates intra-uterine instrumentation, a thing to be avoided whenever endometritis or salpingitis exists; and is never without some risk owing to the very frequent presence of latent pyogenic cocci in the cervical canal.

*Reposition by the sound* is mentioned only to be unqualifiedly condemned as not only dangerous but as most unscientific and unsatisfactory. Occasionally a uterus will be encountered which is attached by an adhesion of greater or less length, or which is attached to a rectum having a long mesentery. In such a case the replacement will proceed to a certain point and then be checked; or, if accomplished, the uterus will promptly assume the retroposed position when released.

It having been determined whether the uterus is retroposed and movable or belongs to the class of fixed retropositions, the method of treatment is to be decided upon.

*Movable Retroposition.*—There are certain cases which have persisted for so long a time and the anterior vaginal wall has

shortened so much that while the uterus may be put into an ante-position, it is impossible to assemble the organs into their normal regional relations. Although such cases are movable, they are cured only by surgical procedures, and not always then. It is one's duty to carefully study each case, and, if possible, determine the cause of displacement and the sequence of the associated conditions. In the case of an uncomplicated retroposition which is readily replaced and in which no lacerations of the soft parts exist, a well-fitted *pessary* will relieve. The pessary is of no use, nay is positively harmful, unless the uterus be first replaced. A pessary is selected of a width between the arms of the greater bow, a little greater than that of the vagina, and of a length equal to the distance between the *cul-de-sac* after the uterus is replaced and the internal urethral orifice. The preferable form is that of Albert Smith. The application of a pessary is an art not to be fully described. After introducing the pessary, the finger should be able to pass all around it, between it and the vaginal wall. The lesser bow should not protrude from the vagina. No painful pressure should be made upon any point, and in case pain is produced the patient should be taught how to remove the pessary. Once every other day a cleansing douche should be taken. The presence of a pessary is no bar to intercourse. In case a pessary does not fit a given case, it being too little curved or too wide, etc., its form may be changed by coating it with vaseline and running it through an alcohol flame. It is moulded then and held in proper shape while being cooled by water. After a patient has worn a pessary for a few months it may be taken out to see if the uterus will remain up without it. Should pregnancy supervene while a pessary is in, it should be removed as soon as the uterus becomes too large to fall back. A PESSARY SHOULD NEVER BE INTRODUCED WHERE ANY INFLAMMATION OF THE ADNEXA EXISTS OR THE UTERUS IS FIXED.

Inasmuch as retrodisplacement occurring in the post-partum woman is apt to keep the uterus in a subinvolted condition, replacing the organ and keeping it up will conduce to involution. This is particularly true if the treatment is instituted before the tissue-changes become permanent—for instance, during the six months following delivery. But in all cases of retrodisplacement which are uncomplicated, and in which there is no laceration of the soft parts, or in which the lacerations have been repaired, a pessary is of great service. Too much emphasis cannot be laid upon

the importance of trying the pessary before resorting to any of the suspension operations. THERE IS TOO GREAT A TENDENCY IN THE PROFESSION TO PERFORM OPERATIONS FOR RETRODISPLACEMENT WITHOUT EMPLOYING LESS SEVERE METHODS FIRST. The pessary is introduced in the following manner: The left index finger is used not only to keep the cervix high and back after the uterus has been replaced by the bimanual method, but also to depress the perinæum. The well-lubricated pessary is grasped by the right forefinger in the lesser bow, and is held firmly by the thumb and middle finger. It is introduced sideways with the curve of the greater bow to the patient's left. As it passes the vulva the greater curve is directed up behind the cervix by the point of the left index finger. In doing this the pessary will be twisted so that its bilateral diameter will be transverse to the pelvis instead of antero-posterior as it was when introduced. When the greater bow is behind the cervix the lesser is tucked up behind the pubes by the finger.

If the uterus has been replaced in the knee-chest or Sims's position the manœuvres are but little different. A PESSARY SHOULD NEVER BE EMPLOYED WHERE THE DISPLACEMENT IS DUE TO ENDO-METRITIS UNTIL THE LATTER HAS BEEN CURED, NOR IN CONGENITAL CASES. In certain very old cases of acquired retrodisplacement, when the anterior vaginal wall has shortened so much that the cervix cannot be shoved high and backward, the pessary should not be used.

If the displacement is discovered during the puerperium, the uterus should be replaced bimanually and maintained in proper position by vaginal tamponade of sterile dressings. After the puerperium the pessary may be substituted for the dressings. It is most important that treatment be instituted as soon as possible after the occurrence of the displacement. The article on subinvolution of the uterus may be consulted in connection with this phase of the subject. The surgical treatment of movable retrodisplacement embraces Alexander's operation, ventro-suspension, ventro-fixation, anterior colpotomy, shortening the round ligaments, etc. In fact, the ingenuity of the surgeon is well shown in the great number of operations devised for this very common group of affections. As before said, none of these operations should be tried until all complicating lesions have been corrected and the pessary faithfully tried.



**Adherent Retrodisplacement** (Fig. 31).—The uterus may in early life become retroverted or retroflexed, and a low form of plastic peritonitis follow which will bind it to the rectum. In such a case the ovaries and tubes are not inflamed. Or, as a result of a mild degree of septic peritonitis, the uterus may be fixed in a retroposed position and the adnexa be uninvolved. But, as a rule, although adnexal lesions cannot be discovered upon examination, by far the greater number of fixed retropositions are accompanied by a greater or less degree of adnexal disease. Therefore the displacement becomes of secondary consideration. In these cases the

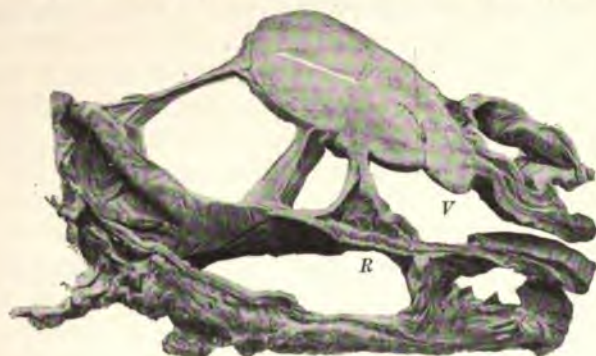


FIG. 31.—ADHERENT RETROVERSION.

pessary, Alexander's operation, etc., become of no avail until the uterus is rendered movable. FIXED RETROPOSITION OF THE UTERUS ALWAYS CALLS FOR AN INTRAPERITONEAL OPERATION. The adhesions should never be severed by forcible bimanual massage (the methods of Sims and Schultze), for it is impossible to accurately measure the degree of adnexal disease which complicates the retrodisplacement or to correct such complication if it exists, unless the peritoneal cavity be opened. The author's preference is for the posterior vaginal section in most of these cases, or the abdominal section and ventro-suspension. The operations of Mann, Wylie, Palmer Dudley, and the author's hysterocystorrhaphy may be performed after the abdomen has been opened and the uterus freed. The operations which are advised will be described later. If pregnancy occurs, it will progress up to the point where the uterus ceases to rise owing to the fixity, and abortion will ensue.

If repeated pregnancies occur, the uterus will abort very nearly at the same period of gestation in each.

### PROLAPSUS

This may be of any degree, from that slight descent which so often accompanies retroversion to complete escape of the organ from the body. It cannot therefore be measured in degrees. It usually occurs in women who have had children, occasionally in the nulliparous. There are essential differences in the two types.

As a rule, the displacement is of gradual formation, but may occur as the result of sudden effort or violence.

**Complete Prolapse in the Parous Woman** (Fig. 32).—The vagina is completely inverted. The tumour hangs from the pubes

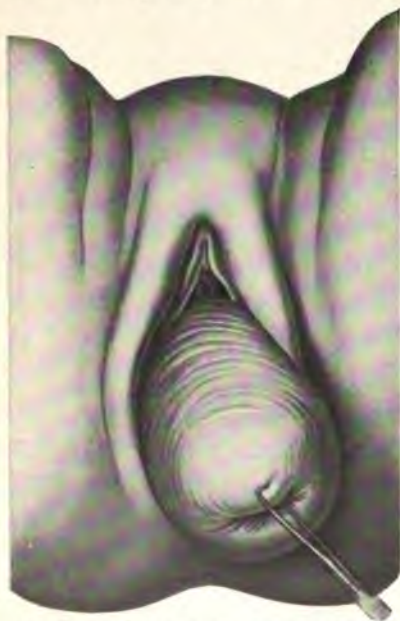


FIG. 32.—COMPLETE PROLAPSE OF THE UTERUS.

through the insertion there of the bladder, from the vaginal attachments to the sphincter ani and pelvic fascia, and from the uterine ligaments. In the presenting mass are the uterus and bladder with the ovaries and tubes lying above. The contents of the sac are often, in old cases, bound together by plastic lymph, making the tumour irreducible. The squamous vaginal epithelium is thickened and scaly. Near the cervical orifice the moisture, together with friction on the thighs, may produce ulcerations. The uterus is engorged from stasis.

If the cervix is torn, its lips are widely separated. The uterus is in a condition of metritis, and hypertrophic endometritis is present. There is retention of urine in the prolapsed bladder, and cystitis occurs. Tension on the broad ligaments produces pressure on the ureters, and hydro-nephrosis may result. Œdema of the mass or inflammation may produce such stasis that sloughing is threatened, or the uterus may become pregnant while prolapsed and become strangulated. The condition is essentially a hernia, and, like inguinal hernia,



is liable to the complications of impaction, strangulation, and irreducibility.

Prolapse of the uterus usually starts from a break in the pelvic floor which disturbs the equilibrium of the intra-abdominal pressure so that the supporting force is less than that operating from above. As a rule the prolapse proper begins first at the cervix, but this has been preceded by the formation of a cystocele, sometimes a rectocele which induces retroversion. Then the true prolapse begins. Attention is again called to page 71, where the mechanism of the pelvic floor is dealt with. The prolapse may begin at the vulva first, the vaginal tube turning inside out at this point and the uterus coming down in practically an unchanged relation to the vagina. Thus, we occasionally see the anteflexed uterus or anteverted uterus as well as one retroposed come out of the body in that position in which it lay when the prolapse began. We may therefore find the uterus lying in almost any shape and position in the prolapsed sac. After a prolapse has lasted a long time, all parts of the uterus become atrophied in many instances, and the same shrinkage takes place in the adnexa. As a result, the prolapsed sac will contain the bladder and an elongated dense cord of fibrous tissue which represents the uterus.

*Symptoms.*—When the prolapse occurs acutely it will be accompanied by rupture of the supporting ligaments of the uterus with great shock due to hæmorrhage and severe pelvic pain. Fortunately, the accident is extremely rare. In chronic prolapse, as the displacement progresses we have the same symptoms as were said to follow retroversion, but intensified. The interference with the functions of bladder and rectum is particularly marked, and these patients have frequently to hold the mass within the body during the acts of defecation and urination. But in some cases of long standing, particularly in women who have passed the menopause, there may be no symptoms whatever other than those due to the inconvenience of a mass between the thighs, and impaired bladder and bowel function. If ulcerations are present, they produce a purulent discharge. Since the lesion is found about the menopause as often as earlier, the menses are decreased as frequently as otherwise. Although these uteri are exposed to much handling and filth, purulent endometritis is infrequent, owing to the free escape of discharges and the perfect drainage.

*Upon examination* will be found an oval tumour whose apex is below and which is somewhat constricted at the vulva. The cervical opening will be found at the apex; the covering of the tumour is skin-like and the attachments of the tumour are at the vulva. The finger passed into the rectum will occasionally pass down the posterior wall, and a sound in the bladder down the anterior. The uterus may be probed and the direction of its canal shown. Ulcerations may be seen at almost any part of the mass, but are most frequent about the cervix. The urine is usually ammoniacal in odour, the bowels costive, and the general health greatly impaired because of inactivity.

As a rule, the mass is easily reduced but readily recurs. When peritonitis has occurred the organs may be so matted together as to be incapable of reduction, although replacement *en masse* be possible. In lesser degrees of prolapse, before the uterus has escaped out of the body, the tendency to do so will be shown by causing the patient to bear down hard as she lies on her back, and the cystocele and rectocele will be seen to roll out and the uterus to descend. The diagnosis is exceedingly easy, and only gross carelessness can confound this condition with polypus, inversion, and infravaginal hypertrophy of the cervix. The prognosis is generally good. The symptoms are relieved by palliative treatment, and the various operations succeed more often than they fail.

*Treatment.*—The attending physician should first determine whether the hernia can be reduced. Mechanical supports should be tried in all instances even though it is intended to operate later; for if retentive operations are performed in a case of long standing the sutures must hold the organs within a cavity which has long become accustomed to their absence, and against an intra-abdominal pressure unaccustomed to their presence. Should ulcerations be present, these must be healed by supporting the uterus with dressings of low percentages of iodoform, frequently changed and held in place by a T-bandage. The best mechanical support is furnished by an air-filled rubber ball. A ball should be selected which can just be made to pass the *introitus vaginae* after the uterus is returned. It is to be removed after the patient retires at night, and reintroduced before rising in the morning. If the patient is stout and has difficulty in replacing the uterus while lying on the back, she may assume the knee-chest posture.



Next to this in usefulness is the cup pessary supported by a waist-belt and suspensory straps. If the patient is old or very feeble, or if for any reason prolonged narcosis and protracted detention in bed would be dangerous, and if mechanical devices do not furnish sufficient relief, the uterus should be removed by the vagina and the stumps fastened to the vault of the vagina. If the patient is in the childbearing period of life and sufficiently strong, an attempt should be made to cure the deformity by operations. Curettage of the uterus should be the first step in all cases where the uterus is large, as it assists in producing involution. The next step is to amputate the cervix in such a way as to fold in the vault of the vagina, by an amplification of the operation described on page 197. This will cause such a narrowing of the pericervical ring of connective tissue that the uterus cannot descend through it. A very close and high colpoperinæorrhaphy should be performed, and in such a way as almost to close the vagina. All these operations can be done at one sitting. But, as has been said, enfeebled old women were better treated by vaginal hysterectomy, for they easily succumb to complications if kept long in bed, and their atrophied tissues furnish but poor support for plastic work.

By some it is thought that complete prolapse is not dangerous, but only inconvenient. This is far from the truth, for cystitis, ureteritis, and pyelitis can occur in women who carry residual urine in their bladders more readily than in old men, for in women infection is more easily contracted through the short urethra. It has not been shown that malignancy is more prone to occur in uteri prolapsed than in others. While the series of operations mentioned are usually sufficient to retain the uterus, yet if the vagina be very voluminous around the cervix it may be narrowed just in front of the cervix on the anterior wall by an oval denudation—*anterior colporrhaphy*.

**Complete Prolapse in the Nulliparous.**—In such cases the uterus is forced out of the body either by pressure of a superimposed tumour or because of great weight in the uterus itself from a uterine fibroid. Added to the symptoms of prolapse are those of the causative neoplasm. Such cases call for abdominal section and removal of the uterus, if it be the seat of a fibroid. If the displacement is caused by an adnexal tumour this should be removed, hysterorrhaphy performed, and a close posterior colporrhaphy done. Mechanical supports in these cases are useless.

**Partial Prolapse.**—The pathology and causation of this condition are the same as in complete prolapse, only the lesions are not as extensive. The uterus comes down in the vaginal axis preceded by a large cystocele. There are present the same pelvic tenesmus, dragging pains in the pelvis, backache, etc., as in retroversion and complete prolapse. The uterus not yet having escaped from the vulva, mechanical supports are not indicated, and if employed will prove inadequate. The uterus should be curetted, the cervix amputated, colpoperinæorrhaphy performed, and possibly anterior colporrhaphy. It is well to do all the operations at one sitting, except the colpoperinæorrhaphy, which should be postponed until the anterior colporrhaphy has healed well; FOR IT IS NOT WISE TO HAVE AN ANTERIOR SET OF SUTURES PULLING AGAINST A POSTERIOR IN A CASE WHERE THE TENSION ON EACH SET OF SUTURES MUST BE AS MUCH AS THE TISSUES WILL STAND. But where a close colpoperinæorrhaphy will suffice to hold up the cystocele, anterior colporrhaphy may not be needed.

**Inversion of the Uterus** (Fig. 33).—The uterus is turned inside out. Childbearing and fibroid tumours are the most common causes. The condition is very infrequent. It starts in a depression at the fundus, and may be of any degree from this to that of a complete inversion. The hollow in the inversion is occupied by the tubes, often the ovaries, and sometimes intestinal coils. The accident may occur immediately after labour, or come on gradually some days later. If due to fibroids it comes on gradually.

*Symptoms.*—As soon as the inversion occurs, an alarming hæmorrhage takes place, rapidly producing a profound shock. The reflex symptoms are vomiting and great uneasiness of mind. Upon examining the case immediately after the occurrence of the accident, the mass will commonly be found protruding from the vulva; but if seen after some days, the shrinkage in the uterus may allow its recession within the vagina. The tumour is deep red in colour, pear-shaped, with apex at the vulva, soft, and bleeding easily, and at the base may be seen the two Fallopian orifices. The tumour can always be partially reduced, and its pedicle is of general circular attachment rather than at one point. These two last points are of especial value in eliminating the possibility of the tumour being a polypus. Rectal examination will find the depression above the attachment of the pedicle, and show the absence of the uterus from its normal position.

The mortality attending the condition is very high and rather sudden, often within a half hour after the occurrence of the accident. Death is due to hæmorrhage.

In rare instances the uterus will become spontaneously reduced, but usually taxis or operation alone will relieve.

*Treatment.—Taxis.*—The sooner attempted the better. Continuous and firm pressure should be made upward by the hand which grasps the entire organ in such a way as to push it upward, while the other hand attempts dilatation above of the inversion



FIG. 33.—INVERSION OF THE UTERUS.

ring. Most cases are readily relieved in this way. Chloroform narcosis is of assistance. The reduction should not be attempted by pushing up on the fundus alone. It is wise to pack the uterus with weak iodoform gauze after reduction and administer ergot. If taxis fails an operation is necessary. The preferable procedure is to tilt the uterus as high upward as possible so as to expose the posterior cervico-vaginal junction. This is then seized by bullet forceps and pulled down. The operator next, and with great caution, incises the posterior lip of the cervix through all its thickness. In doing this the posterior *cul-de-sac* may be opened—a matter of no concern. The two lips of the incised cervix are now

grasped by bullet forceps and steadied while reduction by taxis is done. After replacing the mass, the rent in the cervix is sewed up and the uterus packed with iodoform gauze. If the *cul-de-sac* has been opened it is better to drain this, for these cases have usually been subjected to much handling, and peritoneal infection is easy.

The uterus may occupy other and unusual positions in the pelvis and assume other shapes. It may be *lateroverted* or *lateroflexed*; but such alterations in position and form are usually caused by the pressure of neoplasms or traction by adhesions. The causative lesions rather than the position of the uterus demand treatment.

### LACERATIONS OF THE CERVIX

The cervix uteri may be torn in any direction during labour, particularly if this be accompanied by the use of instruments. But, as a rule, the tears are lateral. The left side of the cervix is more often torn, next in frequency the right side, and bilateral tears are least frequent. The tear may be straight, or forked and stellate. The tear is always limited to the vaginal portion of the cervix. Tears above this would be ruptures of the lower segment of the uterus. The torn cervix may evert, exposing the cervical mucosa to irritation and infection, thus conducing to cervical folliculitis and carcinoma. If the tear is bilateral and deep, it will permit the uterus to sink down and produce reduplication or inversion of the upper portion of the vagina. As a result, the uterus assumes a position in the pelvis lower than normal, and becomes engorged and enlarged. Torn cervices are particularly prone to become cystic, and be thus much increased in size. The low position, the engorgement and cystic degeneration of the torn cervix, make it easy for the epithelium to be rubbed off, thus producing erosions. The enlargement of the cervix, of the uterine body, and descent of the organ as a whole, produce engorgement of the veins of the broad ligaments. This chronic vascular stasis leads to the production of connective tissue in the corpus as well as in the cervix and to hypertrophy of the endometrium. The passage of the sound will even in the worst cases show that the internal os is normal in size or even contracted. Laceration of the cervix is a frequent cause of subinvolution and chronic metritis.

It is necessary to describe a normal cervix in order to deter-



mine what is abnormal, and in doing so I must digress a little (Fig. 34). Nature has provided the woman with a menstrual function at the age of thirteen, and with powers of procreation a year or so later. It is interesting to note that at this age there is scarcely any recognisable vaginal portion to the cervix, and that the external os is a bilateral slit about  $\frac{1}{8}$  of an inch in diameter. The girl is anatomically perfect and physiologically active. Nature intended her to propagate her species at this time, and if she did so her labours would be easy and injury to the cervix unlikely. But civilization has decreed that the exercise of this greatest of all physical gifts shall be postponed until certain accomplishments have been acquired, and in the highest walks of life to about the twenty-fifth year. During all these years of waiting certain subtle changes have been going on in the cervix, as well as in the body of the uterus, the chief characteristic of which is an increase in the vaginal portion. Not in all cases, but in many. Such a woman coming to her first child-bed will suffer an injury to this distorted cervix. It is my observation that first labours, even in women with true antelexion in whom there is no cervical hypertrophy, rarely produce cervical laceration.

THE LACERATION, THEN, IS USUALLY A TEAR IN A CERVIX ALREADY ABNORMAL.

*Symptoms.*—The mere separation of the cervical lips produces no symptoms. The ill effects accompanying laceration of the cervix are due either to lesions which precede the injury or follow as sequelæ. If the tear be extensive it may at once produce a hæmorrhage so severe as to demand treatment. Post-partum hæmorrhage, if accompanied by a contracted uterus, is generally due to laceration of the cervix. Upon exposing the cervix the spouting vessel will be seen opening upon the torn surface.

In view of the effect which wide laceration of the cervix has upon the position and size of the uterus and upon the pelvic circulation, as well as upon the cervix itself, we find that menorrhagia due to uterine and endometrial engorgement is common; that leu-



FIG. 34.—THE NORMAL VIRGIN CERVIX (Berry Hart).

c, the posterior lip of the cervix.

corrhexa, both white and purulent, due to cervical folliculitis, are present; that nervous phenomena due to cystic cervix are seen, and that backache, pelvic tenesmus, hysteria, pain in the nucha, etc., are often symptoms. These symptoms are *not* due to the mere separation in the fibres of the cervix, but to sequelæ.

The "cicatricial plug," which at one time was even thought to cause optic neuralgia as well as other reflexes, has disappeared in the light of more precise pathology. It is claimed by some that the too open cervix conduces to sterility and to abortion. I doubt this. If these conditions exist they are rather due to complications. Sterility is due to a very commonly present endometritis, for the cervix has nothing immediate to do with procreation among mammalia. Most animals have no vaginal cervixes at all and yet procreate; and those which have also sustain lacerations as do women, and do not suffer from sterility. Abortion can hardly be directly due to tears in the vaginal cervix, because the cervical canal at the internal os is more closed than normal, and what abortions occur are not in the later months when the internal os is part of the uterine cavity, but in the early months when the internal os is closed. Abortions are due to accompanying lesions, usually inflammatory, such as adhesions.

I am a firm believer in the influence of abnormal cervixes, particularly if torn badly, as causes of epithelioma of the cervix.

*Treatment.*—In a case of post-partum hæmorrhage the source of the bleeding being a tear in the cervix, this should be immediately sewed up. Not only will such closure of the rent stop the bleeding, but it will also conduce to a more rapid involution. The operation does not require narcosis and is painless.

The proper manner of treating a laceration of the cervix will depend largely upon the coincident complications. No operative procedure should be applied to the cervix if there be inflammatory disease of the tubes or ovaries. Nor should a plastic operation be done upon the cervix if infection of the cervical glands or of the endometrium is present. Bacteriological examination of the uterine discharges will aid in determining this. It is wise to cure all erosions of the cervix and to relieve engorgement by a few days' appropriate treatment before proceeding to operate upon a torn cervix.

There are two operations applicable to the condition under discussion: trachelorrhaphy and amputation of the cervix. Trachelorrhaphy is indicated in all lacerations provided there is no hy-

hypertrophy of the cervix and no cystic degeneration, and no marked hypertrophy of the cervical mucous membrane. How rare such an exception is may be inferred from what I have said. The operation is much abused, owing to a mistaken conception of what is normal and what abnormal. The mere separation of tissues in the vaginal cervix does not call for operation. If there be hypertrophy of the cervix, or marked and general cystic degeneration of the Nabothian follicles, or hypertrophy of the cervical glands, amputation of the cervix is indicated. And as most torn cervixes present some of these lesions, amputation and not trachelorrhaphy is generally indicated when any operative procedure is demanded for laceration of the cervix.

### LACERATION OF THE PERINÆUM

A laceration of the perinæum which does not cause separation of the fibres in the sphincter ani muscle is "incomplete"; one which extends through the sphincter is "complete."

The injury appears in two forms: as a recent or as an old injury. The muscles of the perinæum together with their fascial sheaths form a musculo-fascial diaphragm which closes the pelvic outlet. This diaphragm is perforated by the vagina and the rectum. In an uninjured condition and state of normal muscular tone there is no break in the pelvic floor, and the latter furnishes a perfect inferior support to the pelvic contents and thus helps to maintain the intra-abdominal pressure in equilibrium. The chief factors in the integrity of the pelvic diaphragm are the sphincter and levator ani muscles with their sheaths. So long as the normal muscular and physiological tone of these structures are present there is no break in the pelvic support of the intra-abdominal pressure, even in the act of defecation.

When an incomplete laceration of the perinæum occurs, the vaginal skin is usually, not always, torn, the fibres of the levator ani muscle more or less torn, and the point of attachment of the bulbo-cavernosus muscle to the *transversus perinei* severed, together with laceration of the fascial sheaths of these muscles. After the tear takes place the separated muscular and fascial fibres retract towards their points of fixed attachment. As a result, the viscera which were retained within the pelvis have a tendency to protrude between the torn structures, and the conditions of a true *hernia* are

presented. Separation between the fibres of the muscles and fascia are usually accompanied by a tear in the vaginal skin also, but it must be remembered that the laceration of the muscle and fascia may take place *beneath* the vagina, and without laceration of the latter. The lacerations are usually to one side of the median line, rarely in the centre. They are commonly upon the right side. After the tear takes place, the fibres of the levator ani and its fascia retract towards the "white line" of the pelvis (Figs. 35 and 36). As viewed from below, this retraction pro-



FIG. 35.—CYSTOCELE AND RECTOCELE.

Opposite the lower fingers of the examiner's hands the "angles" are seen. Beneath these are the retracted fibres of the levator ani muscle and fascia.

ceeds upward and outward, and upon each side we notice a sulcus or angle of depression on the posterior vaginal wall between which is more or less of a protrusion of the rectal wall. It is essential that the direction of retraction of the torn muscular and fascial fibres be borne in mind in order that the manner of approximating them by operation may be understood. The longer the injury has lasted the greater the retraction. Absorption of the pelvic fat and general emaciation will add very materially to the extent of the separation. Anatomically the upper fibres of the supporting fascia lie but a little distance below the cervix. This is called the crest of the perinæum. It does not tear unless the

ceeds upward and outward, and upon each side we notice a sulcus or angle of depression on the posterior vaginal wall between which is more or less of a protrusion of the rectal wall. It is essential that the direction of retraction of the torn muscular and fascial fibres be borne in mind in order that the manner of approximating them by operation may be understood. The longer the injury has lasted the greater the retraction. Absorption of the pelvic fat and general emaciation will add very materially to the



lower fibres are torn, but in normal labours merely stretches. This higher attachment of the pelvic fascia and levator ani muscle is what supports the anterior vaginal wall, and it is this which forms the lower border of that somewhat open space about the cervix which we call the vaginal *cul-de-sac*.

From what has been written, it will be seen that I consider the most important part of the pelvic floor to be above the orifice and above what is called the perinæum proper. When an incomplete tear occurs, the higher muscular and fascial fibres retract towards the two "white lines," while the vulval portion is drawn by the sphincter ani backward (Fig. 36). So there is furnished facility for prolapse of the higher pelvic organs, the uterus and bladder, and for the lower, the rectum and urethra. One result of the laceration of the levator ani is removal of the muscular opposition to the sphincter. As a result, active dilatation of the sphincter is impossible, and fæces are forced out only by increased effort of the abdominal muscles. Under this straining the fæces come down to a sphincter which is but partially open, and as a result the rectum bulges out between the "angles" of the vagina and presents as a hernial protrusion or *rectocele* (see Fig. 35). Prolapse of the anterior vaginal wall follows later, and merely because its higher and lower supports are gone. When the anterior wall comes down it drags with it the bladder, forming a *cystocele*. If the urethra drops it is usually due to a coincident injury to its supporting ligaments. As the anterior and posterior vaginal walls descend they drag down the uterus somewhat; but it is more the continuous straining at stool in these cases, with lack of equilibrium in the intra-abdominal pressure, which conduces to retroversion and descent of the uterus. The mere loss of equilibrium, unaccompanied by increase in the pressure from above, is not so potent a factor in producing retroversion and prolapse, FOR WE NOTICE THAT IN COMPLETE LACERATION, WHERE THE SPHINCTER IS TORN, FÆCES ESCAPE WITHOUT PRESSURE, AND DESCENT OF THE UTERUS IS NOT OFTEN SEEN. As less important results of the tear in the perinæum are loss of semen after coition, the entrance and escape of air from the vagina with an embarrassing noise, constipation with impaired digestion, muscular weakness and general malaise, retained urine in a cystocele pouch and cystitis, and chronic invalidism.

When first made, a perineal tear presents as a triangular raw surface to one side of the median line, bleeding freely but with

little tendency to separation between the lips of the tear, livid in hue, and with oedematous edges. The tendency in this injury for the torn edges to remain in apposition conduces to spontaneous healing. Beyond a slight hamorrhage, there are no imme-



FIG. 36.—IN ERROR VIEW OF THE PERINEAL STRUCTURES (Kelly).

The arrows show the direction of effort in the contracting sphincter and levator ani muscles.

diate results of incomplete rupture of the perineum. In view of the remote results, however, the wound should at once be closed. When the tear is *complete*, the sphincter ani muscle straightens out and recedes towards the coccyx (Fig. 37). And as time passes what was once a circular muscle becomes but a bundle of shortened and

• crescentic muscular fibres which have lost their ability to stretch. There is a tendency to prolapse of the rectal wall, and opposite the receded ends of the torn sphincter will be found a dimple, above which are usually several nodular protrusions of rectal mucosa. There is little tendency to the formation of a rectocele or a retro-

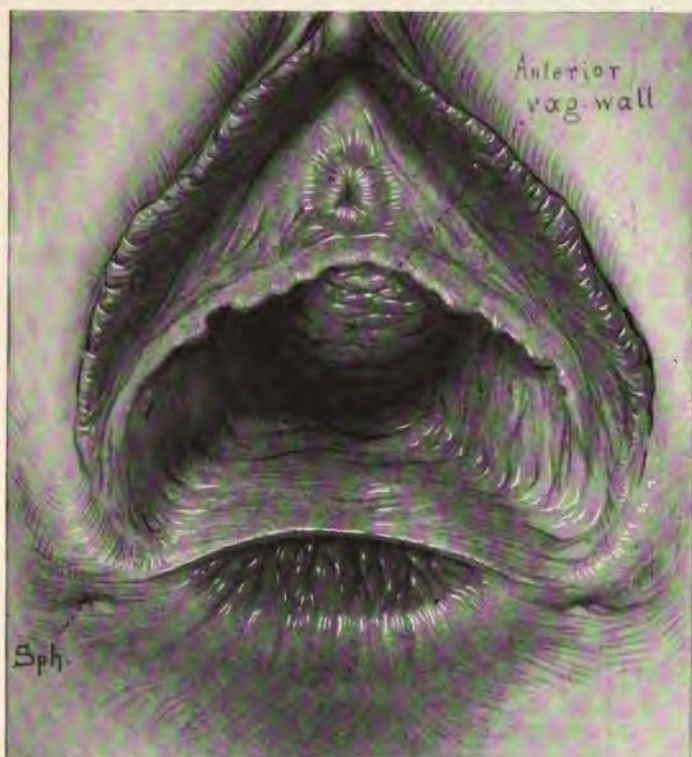


FIG. 37.—RUPTURE OF THE RECTO-VAGINAL SEPTUM, ORIGINALLY EXTENDING HIGH UP ALONG THE POSTERIOR VAGINAL WALL, BUT NOW PULLED DOWN BY THE CONTRACTIONS OF THE SPHINCTER INTO A SHALLOW ARC WITH EXTREME SEPARATION OF THE SPHINCTER ENDS (Kelly).

version, but the bladder and urethra tend to drop. The vaginal septum is commonly torn for a greater or less distance, but rarely higher than the innermost fibres of the sphincter. Fæces and intestinal gases escape without control, keeping the patient soiled and irritated, except when most costive. Whereas laceration of the perinæum is usually upon one side, when the rent severs the sphincter this is usually in the median line.

## CHAPTER IV

### *DISEASES OF THE VULVA*

**Vulvo-vaginal Cyst** (Fig. 7).—The duct of the vulvo-vaginal gland may become closed at any point owing to adhesive inflammation. The retained fluid secretion will then accumulate in the duct and make a cyst of the duct; or the gland itself may become distended, forming a true glandular cyst. These are “cysts of retention,” little or no alteration taking place in their contents, which are viscid and clear, or turbid from admixture of epithelium. They are generally due to gonorrhœa.

*Symptoms.*—The cyst forms slowly and without irritation. After a time the patient notices an enlargement during her toilet. The cyst lies low down on one side near the posterior commissure. It is to be differentiated from abscess in the same location, from hernia, cysts of the round ligament and hydrocele; but the cysts of the vulvo-vaginal gland occupy a much lower position than any of these except abscess. The cyst is little sensitive upon pressure; its contents are found to be fluid and the sac moves freely underneath the skin, signs which are absent in abscess.

*Treatment.*—The cyst may be either incised and the cavity made to heal by granulation with iodoform-gauze drains, or preferably it is to be radically removed.

An incision is made along the cutaneous border of the enlargement down to the cyst. A careful dissection is then begun which proceeds from below upward and in such a manner as to avoid rupturing the cyst or breaking through the thin mucous membrane on its inner side. The nutrient artery lies at the upper side and should be firmly secured. All other vessels are tied to prevent formation of a hæmatoma, the cavity carefully cleansed, and the edges of the wound closed.

**Elephantiasis.**—This is a pachydermatous enlargement of the clitoris, the labia, or the nymphæ, due to connective-tissue hyper-



plasia and obstruction of the lymphatics. It is not uncommon in the negress. It is usually unilateral if the labia are the involved organs. There is frequently a syphilitic history. Lack of cleanliness produces superficial ulcerations.

*Symptoms.*—A dragging pain in the lower pelvis, difficult urination, dyspareunia, foul discharge if ulceration is present, and the odour of genitals which cannot be cleansed, are the common symptoms.

*Treatment.*—The mass should be excised. The vessels are so large that hæmostasis should proceed with the incision. It is not wise to depend upon sutures to control the bleeding; and in drawing down the mass so as to form a pedicle cut vessels may snap back out of reach if too much traction be used on the tissues. The wound is to be closed by sutures.

**Hæmatoma of Vulva.**—This is due to rupture of a vein into the loose reticulated tissue of one labium. Enormous distention takes place, with discoloration of the adjoining skin as well as of the tumefaction. The vulva should be kept clean, and borated talcum dusted over the exposed surfaces so as to prevent even the smallest breach in the tense skin through which infection may occur. The clot is usually slowly absorbed, and should be let alone unless it suppurates; then incision and gauze packing are demanded.

If the patient is seen while the hæmatoma is forming, the mass should be at once opened and the bleeding vessels sought for. The cavity made by this procedure if small can be closed by sutures, but if large it should be treated by the open method.

**Papillomata or Condylomata.**—These warts are due to venereal disease or simply to lack of cleanliness. They may form on any part of the vulva or adjacent skin. They are firm elevations like tufts of the cauliflower blossom; usually occurring in separate islets, later coalescing.

They may be pedunculate or sessile, are of slow growth usually, but grow rapidly during pregnancy, and have no tendency to become malignant. They are composed of connective tissue which springs from the papillæ of the skin. Beyond their superficial external form they have none of the characteristics of papillomatous carcinoma.

*Symptoms.*—These are not distinctive. A ragged outcropping from the skin of the vulva, covered by epithelium, firm and *attached to the skin only*, sufficiently describes the gross appearances.

*Treatment.*—If the growth be attached by a broad base (sessile) it should be scraped away by a very sharp curette and the actual cautery applied to the surface. If there be a distinct pedicle, the growth may be excised, the incision taking in the skin, and the wound closed by sutures. Resorcin in powder form containing one eighth of boric acid and one eighth of subnitrate of bismuth may be used as a powder where operation is refused. Removal is effected under cocaine anæsthesia.

**Hydrocele.**—This is a fluid accumulation in a persistent canal of Nuck. It is a cystic formation extending from the external inguinal ring down into a labium. It can often be reduced unless sacculated. This condition must not be confounded with the swellings produced by ascitic fluid being forced into the inguinal canals. If sacculated, it is to be treated by aspiration and the injection into the sac of 50-per-cent carbolic solution in sufficient quantity to bathe the entire surface of the sac. But if not sacculated, open incision and extirpation of the sac is indicated when recurrence takes place after aspiration. Among the rarer diseases of this region are myxomata, sarcomata, fibromata, cysts of the clitoris and of the nymphæ, and adeno-carcinomata. These conditions are so extremely rare that mention only of them is necessary.

**Kraurosis Vulvæ.**—This is a superficial disease of the vulva characterized by a progressive atrophy of certain parts of the vulva. There first appear a few painful maculæ about the vulval orifice. The clitoris shrinks and its glands disappear. The labia and nymphæ atrophy so that together they form but a slight ridge upon each side. The vulval orifice is rigid and unyielding, and the pudendal hair is lost. There is a flattening of the vulva, and the tissues of the vestibule become cicatricial. Essentially the disease is a proliferation of the connective tissue in the corium, the new cells subsequently contracting and producing a condition of sclerosis. The cause is unknown.

*Symptoms.*—The least touch to the involved area produces pain. Coitus is impossible. Pruritus occurs in about one third of the cases. After it has lasted some years local loss of sensation supervenes and the patient gets relief.

*Treatment.*—A pledget of cotton moistened in  $\frac{1}{2}$  per cent lysol kept against the vulva will afford relief. Excision, if extensive, will often relieve, but should not be undertaken until limitation of the disease is established, lest recurrence take place.

**Carcinoma of the Vulva.**—As a primary disease carcinoma of the vulva is exceedingly rare; it is more frequently seen as secondary to cancer of the uterus. It may be found at the meatus urinarius, on the clitoris or nymphæ. It starts as a nodule covered by thickened epithelium, which later breaks down into an ulceration. These ulcers spread backward and laterally, but do not invade the vagina. It is usually seen after forty years of age.

**Symptoms.**—In the early stage of infiltration there is pruritus vulvæ of a persecuting type. Later, when ulceration ensues, there is a fœtid bloody discharge. The lymphatics are early enlarged, not always from extension but from absorption of discharges. The cancer nodule on examination is hard and broadly attached to the involved organ, but it may have a pedicle. The cancerous ulcer is very friable, bleeds readily, and has ragged œdematous borders. After ulceration begins extension is rapid. The disease is to be differentiated from inflammatory conditions and tuberculosis.

**Treatment.**—If extirpation can be practised in such a way as to allow the incision to proceed through normal tissue, this should be done. Otherwise the surface should be kept clean by curette and cautery, followed by mild antiseptic solutions, and the internal administration of thyroid extract.

**The Clitoris.**—This may be the seat of any one of the neoplasms affecting the vulva. The most common disease peculiar to the organ is clitoritis, or inflammation of the *glans clitoridis*. This is usually due to the accumulation and putrefaction of smegma beneath the prepuce. It produces œdema of the prepuce and glans, redness and itching, and in children may lead to masturbation. In adults it is often the cause of a peculiar irritable nervousness. The *treatment* consists in peeling back the prepuce until the *corona glandis* is exposed, and wiping off all filth by means of cotton and boric-acid solution. The surface is next dried and smeared with vaseline. For a few days the prepuce should be peeled back each day and the salve again applied.

**Tuberculosis of the Vulva.**—This disease is not as rare in the experience of those who have large gynæcological services among the phthisical as is stated by many. I have seen 4 cases myself.

The pathology is that of tuberculosis of other muco-cutaneous surfaces. The tissues are infiltrated by leucocytes, epithelioid cells, giant cells, and tubercle bacilli.

The disease can undoubtedly begin as a purely local affection, but it may be due to tuberculosis in the genital tract above.

*Symptoms.*—At first there is a livid discoloration, then nodulations of the skin or mucous membrane, rapidly followed by ulceration of the caseous infiltrations. The ulcerations are at first separated, but soon coalesce to make one large ulcer. The ulcer is shallow, its margins irregular and elevated. Bleeding is not easily produced, and upon scraping the bottom of the ulcer the pale granulations of tubercular tissue are seen. The margins and base of the ulcer are not hardened. The ulcers occasionally partially heal, but only temporarily. There is little or no pain produced; the discharge is sanious.

The *diagnosis* is to be made from cancer and syphilis in the early stages and from cancer and chancroid in the later. Multiple nodules, then multiple ulcerations, and absence of general glandular enlargement, are the chief points upon which syphilis is excluded. Chancroid does not cause the diffuse infiltration about the ulcer which accompanies tubercular ulceration. With carcinoma in its early stages there is seen the single hard elevated nodule, perhaps eroded. Later the metastatic nodules are found and the adjacent lymphatics are enlarged. Pain is a common symptom of carcinoma and is absent in tuberculosis. Microscopic examination of a portion excised under cocaine will clear up the diagnosis.

*Treatment.*—A wide dissection of the involved tissues is successful in curing the disease. The author has succeeded in removing the clitoris, nymphæ, labia, and closing the wound by a plastic operation at one sitting. The steps of the operation are the same as where similar organs are the seat of cancer. The application of the cautery and escharotics usually fails and makes a subsequent radical removal more difficult. It is probable that the X-ray will cure those cases in which the cutaneous surfaces only are involved.

### DISEASES OF THE VAGINA

**Vaginal Cysts.**—These arise from one of two causes: either from remains of the duct of Gaertner or from a blocked lymph space, possibly from a vein which has become varicosed, obliterated, and filled with serum. They are usually single. Rarely a vaginal cyst will be dermoid.

There are no distinguishing *symptoms*. The cyst is fairly



thick-walled with clear contents. Pain is absent. The *treatment* comprises evacuation by incision, exsection of a portion of the cyst wall, and the open treatment of the cavity.

The vagina may also contain chains of *calcareous* matter, which evidently form in the clots of old obliterated veins. Fibroid tumours, carcinoma, and sarcoma are some of the rarer forms of tumour springing from the vagina. When it is possible, complete excision is indicated. The embarrassment to this is found in the proximity of the two hollow viscera, the rectum and bladder, between which and the vagina only thin walls exist.

**Condylomata of the Vagina.**—These warty growths have the same characteristics as those on the vulva. They are firm and usually covered by epithelium, but may be superficially eroded; are to be differentiated from papillary carcinoma; and are to be removed by the sharp curette, followed by a touch of the actual cautery. But if of small size the growth may be excised and the wound closed by suture.

**Senile Vaginitis.**—It is found in old women and occasionally in young women who have been subjected to castration. The tissues are injected in spots, and the epithelium is readily rubbed off. Or there may be larger or smaller patches which fuse together in places, and form constricting adhesions. The condition has been likened to buccal psoriasis. The vagina should be kept lubricated by lanolin or zinc ointment.

**Tuberculosis of the Vagina.**—This may be due to semen from a tubercular male or to an extension upward from the vulva, or be primary or secondary to uterine tuberculosis. There is at first nodular infiltration by cells and bacilli, speedy formation of separate ulcerations, then confluent ulcerations. The ulcer is shallow, with elevated ragged edges. The floor of the ulcer shows tubercles underneath a covering of cheesy material. As the ulceration progresses it may open into the rectum or bladder. The discharge is watery or purulent and profuse. Pain is absent as also is sensitiveness. The glands are not often enlarged.

The *diagnosis* is not difficult, and is to be made from cases of aggravated vaginitis, carcinoma, and syphilis.

*Treatment.*—The involved field should always be excised if possible. Otherwise the cautery should be used to as great a depth as is safe, and injections made into the base of the ulcer of a watery solution of metallic iodine (1 to 5,000). The ulcers may also

be painted with tincture of iodine. In case a fistula into the rectum or bladder has been produced, the tuberculosis should be first cured if possible, and then the appropriate plastic operation performed.

### DISEASES OF THE CERVIX

**Hypertrophy.**—This assumes two chief forms: supravaginal hypertrophy and infravaginal hypertrophy.

**Supravaginal hypertrophy** (Fig. 38) is characterized by an elongation of that portion of the uterus which lies between the cer-

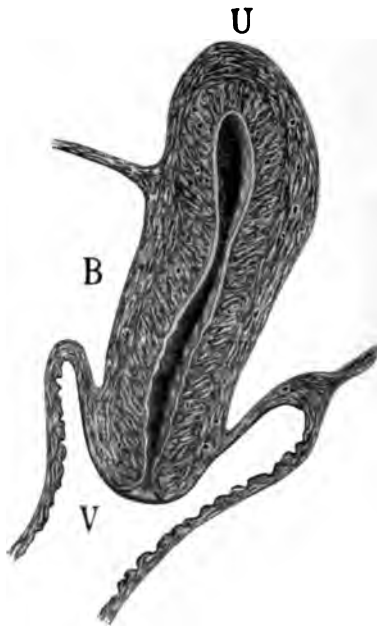


FIG. 38.—SUPRAVAGINAL HYPERTROPHY OF THE CERVIX.

U, uterine fundus; B, bladder; V, vagina.

vico-vaginal junction and the internal os. The condition is found only in the nulliparous or primiparous, and is not seen in women who have borne children. The great weight of the uterus causes it to become prolapsed, the inversion of the vaginal tube beginning above.

**Symptoms.**—The mobility is less than in true prolapse. The condition produces pelvic tenesmus, backache, difficult defecation, and difficult and often painful urination due to putrefaction of residual urine. Sometimes the case closely simulates true prolapse. The base of the tumour lies above, its apex below; the reverse is the case in true prolapse. A sound introduced into the bladder and the finger into the rec-

tum will show that the body of the uterus lies between, a condition not present in prolapse.

**Treatment.**—The treatment is purely surgical. Inasmuch as the uterus cannot be wholly replaced, artificial supports should not be used. The cervix should be amputated as high up as possible by Schroeder's method, or some modification of that. During healing the uterus should be kept as high in the pelvis as possible by

means of vaginal tamponade. The ultimate shrinkage is far greater than the decrease immediately produced by the operation; and although but a small portion of the hypertrophied organ be removed, the post-operative contraction is such as to produce a marked diminution in the enlargement.

**Hypertrophy of the Infra-vaginal Portion (Fig. 39).—**

This is characterized by an increase in the normal structures of the portio vaginalis. The hypertrophy may be so great as to cause the cervix to project from the vulva, in which case a pressure ulcer on the fourchette is not uncommon. The enlargement begins in early life. The patient is sterile. The *symptoms* are not characteristic. The *diagnosis* is readily made from polypus, inversion, and prolapse. There is found the opening in the cervix; the tissue of the mass is directly continuous with the uterus above, and rectal examination will show the body of the uterus in about its normal position. The *treatment* is surgical only. The cervix should be amputated by Schroeder's method or some modification. Not more than two thirds of the hypertrophy should be removed lest post-operative shrinkage be extreme.

The condition is not to be confounded with that form of elongation of the cervix which accompanies one type of ante flexion.

**Cervical Condylomata.**—These form upon the vaginal face of the cervix. They are usually sessile, being attached by a broad base. They may occur as isolated buds, or the entire cervix may be covered by them. They resemble papillary cancer upon hasty examination, but are firmer, less friable, and do not bleed as easily under pressure as cancer. They are covered by epithelium, and only exceptionally have superficial ulcerations. They are usually accom-

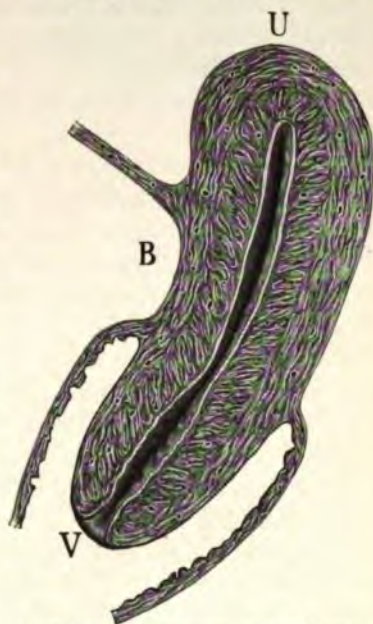


FIG. 39.—HYPERTROPHY OF THE INFRA-VAGINAL PORTION OF THE CERVIX.

panied by a profuse leucorrhœa, and are often found associated with vaginal condylomata. Excision of the affected area is indicated.

**Tuberculosis of the Cervix.**—The lesions are identical with those of vaginal tuberculosis, only that the density in the cervical disease is greater. The symptoms are few and the disease can be distinguished from cancer only with difficulty. The microscope will clear up the diagnosis either by showing the bacilli or by eliminating cancer.

Tuberculosis of the cervical canal is characterized first by a thickening, then ulceration of the glands. The diagnosis is to be made by microscopic examination only. Both forms are exceedingly rare, and are caused by an extension upward from the vagina; but cervical tuberculosis does not cause the disease in the body of the uterus, the internal os being apparently the stopping point of the ascending process.

The symptoms are those of endocervicitis. The treatment consists in a broad amputation of the cervix.

**Vaginismus.**—This is a functional disturbance characterized by spasm of the levator ani and constrictor vaginæ muscles when the vulva is touched either during coitus or examination. It is often associated with flexures of the uterus which cause dysmenorrhœa, and may be due to sensitive papillæ forming at the point of rupture of the hymen. The spasm may be so complete as to prevent coitus. It is accompanied by pain. If attempts at coitus are persisted in, laceration of the vagina may occur. The condition does not occur unless entrance into the vagina is attempted.

*Treatment.*—A strong cocaine ointment may be applied to the margin of the hymen, or this may be touched with a 10-per-cent cocaine solution. After local anaesthesia is secured, the examination can proceed. In aggravated cases not yielding to cocaine, general anaesthesia is necessary. During this the remains of the hymen should be excised and the vaginal orifice thoroughly dilated. The cut edges are then approximated by a running suture of fine tendon. At the same time any fault in the uterus should be corrected. The condition does not recur after once cured. Sometimes after excising the remains of the hymen, the vaginal orifice is kept open by the patient wearing during the day Sims's glass plug which was designed for this purpose. This is worn for two weeks, being removed at night. Much domestic unhappiness results from this condition, which can be corrected by explanation and a simple operation.



## CHAPTER V

### FISTULÆ

*Vesico-vaginal, Uretero-vaginal, Recto-vaginal, Uretero-utero-vaginal, Urethral, Intervisceral, Abdominal, Abdomino-intestinal, Vesico-intestinal, Vagino-intestinal, Nephro-lumbar, and Other Rarer Varieties*

FALSE passages may be produced by sloughing in the attempt of Nature to evacuate harmful products, or by injuries; or be intentionally made by the physician for therapeutic purposes; or be due to the weakening effect of neoplastic infiltrations upon dividing walls. Urinary fistulæ are the most common, and next in order are the abdominal.

#### **Vesico-vaginal Fistula (Fig. 40).**

—A vesico-vaginal fistula is an opening in the vesico-vaginal sæptum. It is caused by trauma in delivery, accidentally during operations, purposely to drain the bladder, and by cancerous ulceration. The fistula may be but a pinhole opening, or there may be loss of nearly the entire sæptum. The amount of scar tissue about the fistula has an important bearing upon the result of operation. The urine either escapes wholly or partially by the vagina. As a result, the bladder is never distended to its full capacity; it becomes contracted, inelastic, and atrophied. The external genitals are excoriated by urine, and because of her disability the patient becomes a recluse. Cystitis is frequent because pathogenic germs have ready access to the bladder.

*Treatment.*—If the fistula is seen soon after produced and has sloughing edges, it is useless to attempt closure, and the sloughs on

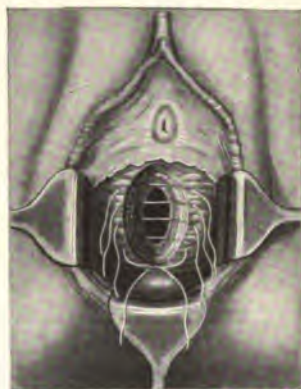


FIG. 40.—THE CLASSICAL OPERATION FOR VESICO-VAGINAL FISTULA.

no account should be trimmed away. The sloughs separate most readily when the fistulous opening is well covered on the vaginal side by a number of sheets of silver foil. In lieu of this, frequent cleansing douches of some mild antiseptic, which will not irritate the bladder mucosa, should be used, such as weak formalin solutions. The fistula should be closed as soon as its edges are clean and before the tissues have lost their elasticity. It is well before operating to render the urine sterile by the administration for a few days of urotropin, and to cure any existing cystitis by means of bladder irrigations.

*Operation.*—The patient is preferably in Sims's position, the operator being seated. The perinæum is held back by a short Sims's speculum and the fistula exposed. If vaginal scars interfere with the approximation of the edges of the fistula they should be divided, but only *down to* the vesical mucosa. The edges of the fistula are best denuded by means of a very sharp, blunt-pointed, straight bistoury, or by means of Sims's scissors. The denudation is made in such a way as to form a bevel at the expense of the vaginal skin, and the denudation should not include the vesical mucosa. The hæmorrhage is slight. Many variations in the technique of Sims have been proposed, but none is worthy of acceptance. The use of soft and buried suture material cannot be too strongly condemned. The smallest possible needle threaded with a carrier and No. 28 or 30 silver wire are to be used. The sutures are applied about  $\frac{1}{4}$  of an inch apart, and are left in place ten days.

The operation is best done under continuous irrigation with normal salt solution. In selecting the direction in which the line of approximation shall be made, the surgeon is governed by the tension of the tissues. Occasionally the classical bilateral approximation must be abandoned for an antero-posterior, or even an angular or curved line; BUT THREE POINTS SHOULD NEVER BE BROUGHT TOGETHER. The wire is twisted with just that degree of tension which secures approximation without strangulation. After twisting the sutures and turning the ends so as not to stick into the flesh, the line of union is thickly covered by silver foil. The catheter should be passed every two hours under the most precise conditions of cleanness. After forty-eight hours the catheter is used every four hours, and on the fourth day the patient voids. The urine should be kept sterile by urotropin, and dilute by the ingestion of large quantities of water. Every second day the wound is

covered by fresh layers of silver foil. The advantages of the silver suture are many. It is not only aseptic but positively antiseptic; it does not absorb moisture and therefore does not swell; it can be fastened with greater accuracy than any other suture, for the knot may be tightened or loosened at pleasure; the knot never slips, and the loop which approximates the tissues never changes its shape. It is this latter property of approximation along all parts of the loop which gives silver wire an advantage over all other suture material.

Much ingenuity has been displayed by surgeons in dealing with fistulæ of large size which do not admit of closure by the classical method; notably by Freund, who sutures the uterus into the cleft; by Martin, who turns up lateral vaginal flaps so as to fill in the gap; and by Howard Kelly, who dissects the bladder away from the uterus as is done in vaginal hysterectomy, and then sutures the bladder walls together in such a manner as to make a transverse scar.

**Uretero-vaginal Fistula.**—Ureteral fistulæ are seldom the result of disease, being usually of traumatic origin. Only occasionally will such a disease as cancer cause an erosion and break into the ureteral walls. So far as known, inflammations, tuberculosis, neoplasms and displacement by neoplasms, do not cause breaks into the ureteral lumen. Uretero-vaginal fistulæ are of two types: one in which the ureter is directly wounded by operative procedure; the other when it sloughs because its nutrient vessels are cut off. In the first class are included those cases in which the ureter is cut or clamped, or sloughs from forcipressure, always in vaginal operations. In such accidents the injury is limited to a small area of the ureter, and plastic operations more often succeed in closing the defect. But in abdominal operations in which the ligation of the uterine vessels is effected some distance from the uterus, as a rule, the ureter is either kinked by a mass ligature in such a manner that it sloughs for a considerable distance, or else it is directly ligated. Up to an inch, or even a little more, from the bladder, the ureter is supplied by a vessel which springs from one of the vesical arteries. Outside this point the ureteral artery is a sprig from the uterine or even is a branch of the internal iliac. Inasmuch as abdominal operations in which the ureter is wounded usually embrace the removal of the uterus, all the vessels distributed to the lower 2 inches of the ureter are more or less interfered with. This distinction between the manner in which the

fistula is produced is of prime importance in determining the nature of the operation to be applied for the relief of the fistula. The diagnosis is not difficult. In vesico-vaginal fistula a fluid colored by methylene blue when injected into the bladder will escape into the vagina; in uretero-vaginal fistula it will not. Direct cystoscopy will possibly reveal the old ureteral orifice, but no urine will be seen to escape. If the urine drawn from the bladder by catheter is measured it will be found that in a given number of hours it is about the same as that obtained by a small ureteral catheter passed into the uretero-vaginal fistula. Vesico-vaginal fistulæ are usually low down, uretero-vaginal are more often near the cervix or vaginal scar. By far the preferable operation is the following, but is applicable only to those cases in which there is little or no loss of the ureteral tube: An opening is made into the bladder at the fistulous opening; the bladder is dissected away from the uterus high enough up to be sure that the ureter is passed; the raw surface thus created on the posterior wall of the bladder is then sutured to the artificial fistula, thus folding the ureteral fistula into the bladder. Or, the vaginal skin may be dissected away from the posterior face of the fistula, the bladder entered just anterior to the fistula, the fistula turned upward into the bladder, and the wound closed. Some modification of these applications of the same principle will usually suffice in small fistulæ. When there has been much loss of the ureteral tube, and particularly if hysterectomy has accompanied the injury, it is better to perform laparotomy, dissect the ureter from its bed and implant it into the bladder. Even when the ureter is too short to reach the bladder, the bladder may be dropped down so as to reach it. After all other means have failed lumbar nephrectomy is to be performed. *Uretero-utero-vaginal* fistula always calls for laparotomy and implantation of the ureter into the bladder. If during an abdominal operation the ureter is cut, its ends should be accurately approximated over a flexible ureteral catheter which is passed down and out of the urethra, the catheter to be removed in four days. Or the ureter may be implanted into the bladder. If both are impossible and the patient is strong enough to stand it, the kidney should be removed. Or, if the patient is very weak, the ureter may be brought out of the incision and the kidney removed later. Implantation of the shortened ureter into the bowel, as advised by some, leads to suppurative disease of the kidney.



**Urethral Fistula.**—This is found as the result of injuries inflicted during labour, or from operations. It is closed without difficulty, even where large areas of the urethra are lost. If the closure produces stricture of the urethra, this is to be dilated by sounds after convalescence is complete. Small fistulæ are to be closed bilaterally in an antero-posterior line, while large openings are closed by bringing down the upper edge and uniting it to the lower by means of a transverse line of sutures.

**Recto-vaginal Fistula.**—The opening may be high up near the cervix or low down near the perinæum. The bowels should be thoroughly emptied by a large dose of castor-oil, and the patient put on liquid diet. If the fistula is situated near the cervix it is to be denuded in the same manner as with vesico-vaginal fistula and closed by silver wire; the sphincter is then paralyzed by stretching, and a silver or glass tube 2 inches long and  $\frac{1}{2}$  an inch in diameter is introduced into the rectum; this is worn for six days during which the diet is still fluid. If the fistula is near the perinæum, the latter should be cut entirely through so as to make a complete laceration, the fistula trimmed and closed down to the sphincter, silver wire being used. The sphincter is closed a month or so later.

**Intervisceral Fistula.**—There may be a communication between a pyosalpinx and the rectum; or between an ovarian cyst and the colon or small intestine; or between the intestine and the bladder. If during an operation for the removal of a pus focus it is found that there is a fistula leading into the gut surrounded by sloughing granulation tissue, a grave complication has to be dealt with. If the opening is into the small gut and not over  $\frac{1}{4}$  of an inch in diameter, the edges of the fistula should be pared and closed by Lembert's sutures in two tiers; but when the opening is larger such a method of closure would produce too close a stricture, so fistulæ in the small intestine of  $\frac{1}{2}$  an inch demand resection of the intestines, the anastomosis being preferably by Murphy's button. If the opening is into the rectum or sigmoid, the edges should be pared and sutured if possible parallel with the gut, an abdominal or vaginal drain of iodoform gauze inserted, the sphincter completely paralyzed, and for some days a large tube be kept in the rectum to facilitate escape of gases.

Fistulæ between ovarian tumours and the gut are treated in the same manner. An appendicular abscess may communicate with one of the right adnexa, necessitating removal of the appendix

and inversion of the stump after the adnexal disease has been dealt with.

A fistula between the gut and bladder is rare except when due to the encroachments of cancerous infiltration. As a rule, small intestino-vesical fistulæ close without suture after the intestinal lesion has been corrected, merely by keeping the bladder empty, but it is safer to carefully suture the bladder opening as well. I have seen 2 cases of abdomino-vesical fistula, both of which were readily cured by laparotomy and suture.

**Abdominal Sinus.**—While this is not a true fistula it is at least an opening into the peritoneal cavity and through the abdominal wall. The lesion is not uncommon and follows laparotomy in which drainage has been used. At the bottom of these tracks are either ligatures or a mass of infected granulation tissue. The track is tortuous and usually leads down into the pelvis near the pouch of Douglas. I have treated and cured 9 such cases by performing vaginal hysterectomy, thoroughly cleansing the fistulous track by blunt curetting, irrigation of the sinus, and closure of its abdominal end. In 8 of these cases I recovered silk ligatures. I have also tried mere vaginal incision, but have found that with that I could not properly cleanse the fistulous track nor sufficiently drain its bottom.

**Abdomino-intestinal or Fæcal Fistula.**—There is a sinus leading from an abdominal scar into a pocket in the pelvis, usually in Douglas's *cul-de-sac*. Through this sinus escapes a watery pus occasionally containing granular fæces, and intestinal gases constantly bubble up through the opening. For unknown reasons these openings close up spontaneously, remain closed for a time, then re-open. While closed they are accompanied by pain and fever; and patients having such a lesion soon learn the necessity for providing a free escape to the contents of the sinus. The opening into the gut is usually in the rectum or sigmoid, rarely into an adjacent knuckle of small intestine. In case the lesion is a sequela of appendectomy the opening will be into the cæcum.

The *treatment* is embraced in providing a free escape for the fæces *below* and closure of the sinus above. This is usually accomplished by removing the uterus and adnexa by the vagina, in case the opening is in the rectum or lower sigmoid, closure of the opening by suture and rendering the sphincter ani incompetent. If, after performing vaginal hysterectomy, it is found that the hole

in the gut cannot be closed by suture, the vaginal dressings should be made to extend *above* it. After completing the removal of the uterus free washing of the sinus from above should be made before the dressings are inserted. While the operator is engaged in the application of the dressings to the vaginal operation, an assistant may resect the track of the fistula above along its passage through the old abdominal wound, and close the opening with silver wire. Even though the faeces discharge into the vaginal dressings, they will not become badly soiled for some days, and ample time is given for the abdominal portion of the sinus to close. When this much is secured the lower portion of the fistula readily closes under the open treatment of the vaginal wound. If the sinus leads into a knuckle of small gut, it forms one of the gravest abdominal lesions. Such an opening is closed only by a wide abdominal section outside the involved field, the operator through this freeing all the adherent knuckles of gut until the opening is found. This latter is then closed either by suture or resection of the bowel and anastomosis by the button. In performing such an operation all portions of the fistulous tract must be scraped and cleansed as soon as exposed. It is utterly impossible to do a technically clean operation in such cases, and to employ drainage is to invite the re-formation of the sinus. Hence the wound is to be closed, even though the mortality is high.

When a patient presents with a faecal fistula it is important to determine, in view of the differing techniques for closing the various forms, the point at which the sinus enters the gut. If it is into the small gut, the sinus remains constantly open and discharges liquid or finely granular faeces; while if into the large gut, it has a tendency occasionally to close, and the faeces are discharged in larger lumps. It is my practice in these cases to entirely empty the bowels by castor-oil, afterward keeping the patient on liquid diet. I attempt to locate the opening in the large intestine in the following manner: The patient is placed in the knee-chest posture, and normal salt solution is run into the bowel. If the fluid appears in the sinus before a pint has entered, the opening is in the rectum, the quantity retained before escaping through the sinus indicating approximately the height of the opening in the bowel.

**Vagino-intestinal Fistula.**—This is occasionally seen after an improperly performed vaginal hysterectomy, and is usually due to

pressure of forceps upon the gut. The opening is usually into the rectum, rarely into the small gut. The scar should be opened through the vagina and the gut pulled down. Its edges are trimmed and closed by interrupted sutures of fine kangaroo tendon. The wound in the vaginal vault must be partially closed, leaving a small opening for a gauze drain, and the sphincter ani rendered incompetent. It is well for the patient to wear a rectal tube for a week. If the opening is into the small gut laparotomy is usually demanded; but where the gut lies low down and the vagina is voluminous, the surgeon may attempt resection and either suture or the application of the anastomosing button through the vagina.

### DISEASES OF THE URETHRA AND BLADDER

**Urethritis.**—*Acute.*—This is always due either to gonorrhœa or caustic irritants when occurring in adults; in children a milder type is sometimes due to staphylococci and streptococci. The epithelium is swollen and in places exfoliated so as to produce small ulcerations. The tubular glands of the urethra are clogged with epithelium and pus cells. The cocci lie upon the surface, in the epithelium, and deep in the glands. They extend up into Skene's tubules. The urethra is œdematous, swollen, and red. Pus escapes from the urethra, or the finger inserted into the vagina can be made to press pus from the urethra. The condition may be general throughout the urethra or limited to the lower portion. The infection of but a portion of the urethra is more common than supposed. I found the gonococcus in the urethra of 6 per cent of private patients and 26 per cent of clinic cases. It exists in 49 per cent of prostitutes. In collecting discharge for examination, the urethra should be pressed upon through the vagina.

The *symptoms* are frequent and painful urination, pruritus, and discharge of yellowish or greenish pus. Upon examination the pouting, swollen, red urethra is seen to contain a drop of pus. The vestibule is inflamed, and punctate spots of red show the mouths of the vestibular glands. The orifices of Skene's tubules are swollen and reddened. The urethra is sensitive to touch. If the urethra is cocaineized and inspected through an endoscope the area of inflammation as well as the lesions may be well seen. After the symptoms have lasted from five to ten days they gradually subside and the condition becomes chronic.



*Chronic.*—This will assume the type of a chronic superficial inflammation or a peri-urethritis. In the first form the mucosa is reddened, its vessels unduly prominent, and the urethral folds intensified and thickened. Digital examination easily detects the thickening of the urethral walls, and massage of the urethra from the neck of the bladder downward will usually produce a little pus at least. If the peri-urethral structures are involved, there will be produced an abscess in one or the other of Skene's tubules, or a *suburethral abscess*. This latter condition occurs in but a fractional percentage of all cases of urethritis. It is an abscess forming in the vagino-urethral septum, is covered by thickened vaginal skin, and communicates with the urethra by a small opening. It is of slow formation and probably starts in an intensified inflammation of a particularly long glandular tubule. The purulent contents escape in gushes at irregular intervals, and can be expressed by the finger. The condition is essentially chronic and not accompanied by acute symptoms. The patient will usually complain of a "lump" only, perhaps also of the discharge. The abscess may reach a diameter of 2 inches. Pressure upon the sac will cause pus to flow from the urethra, and then a fine probe can without difficulty be introduced into the sac. The opening may readily be seen by an endoscope. Gonorrhœal urethritis has a tendency to become latent and chronic, producing no symptoms. In this state it may infect others, extend to the other organs of the afflicted woman, or become acute upon the slightest cause. Therefore every case of acute urethritis is not an indication of a fresh inoculation.

*Treatment.*—Gonorrhœal urethritis in the adult female is a disease which may be accompanied by the gravest complications or followed by the most destructive lesions. The female urethra, like that of the male, is the natural habitat of the gonococcus; but this form of urethritis has in the female far greater significance than in the male. Not only can it seriously damage the urinary organs of a woman, but it can also destroy those structures more intimately identified with reproduction. It therefore becomes the duty of the attending physician not only to treat the local condition, but also to protect those important organs which lie higher up. This latter is accomplished by rendering the urine antiseptic by the administration of urotropin, and by keeping in the vagina a light pack or iodoform gauze. This is introduced through a speculum and should not come into contact with the infected urethra. It is

changed once in three days. No local treatment is given while the acute symptoms are present. The urine is increased by taking large quantities of water, the patient lies down all the time, and frequent bathing of the parts is indulged in, the bath being a very weak solution of bichloride of mercury (1 to 20,000). After the disease has become subacute—namely, in from five to ten days—the thin-bladed bivalve urethral speculum is introduced to the neck of the bladder and its blades opened just enough to uncover an appreciable portion of the urethral mucosa. A cotton-wrapped applicator is then dipped in solution of nitrate of silver (grains v to f ʒj) and introduced to the end of the speculum. By turning the speculum the application may be brought into contact with all parts of the inflamed area. This application is to be made every day or so, the frequency depending upon the severity of the symptoms. If the gonococcus is still found after using this preparation for several weeks, ichthyol in boroglyceride (5 per cent) may be applied in the same manner once in three days. **NO CASE SHOULD BE CONSIDERED CURED UNLESS THE GONOCOCCUS IS FOUND TO BE ABSENT AFTER REPEATED EXAMINATIONS.** If the infection produces suppuration in Skene's tubes these must be slit up and cauterized by nitrate-of-silver stick or touched with pure carbolie acid.

*Sub-urethral abscess* always calls for an operation. The thickened walls of the abscess are excised by an elliptical incision, the cut edges sloping down to the opening into the urethra. The operation should proceed under a stream of sterile salt solution, and every particle of the lining of the pus sac must be removed. This is facilitated by a large male sound held in the urethra by an assistant, thus affording a rigid body against which to cut. The resulting raw surfaces are brought together by No. 30 silver wire in an antero-posterior direction.

**Urethral Caruncle.**—This is in two forms. The more usual is that of a pedunculate glistening red body protruding from or occupying the urethra. It is a capillary circoid aneurysm covered by epithelium, the small vessels forming a network in the growth. There may be absolutely no symptoms to denote its presence. But, as a rule, ardor urinæ, local sensitiveness, and pain darting upward are present. In extreme cases the general nervous system will be affected. If the growth is bruised, slight bleeding is caused. The treatment consists in removal of the growth. This is best done by cocainizing the urethra and vestibule, grasping the growth with

a tenaculum, and burning it off with the Paquelin cautery so as to scar its base. It may be removed by scissors and the wound closed by sutures, but is more apt to recur after this.

In the second form of caruncle the growth is but a protrusion at the point of least resistance of a generally varicose urethra. The condition is readily seen with the endoscope. It is most often found in elderly women, and is one of the most frequent causes of recurrence of caruncle after removal. Stricture of the meatus is commonly present. Under thorough cocainization the urethra is fully dilated by a speculum. Four parallel lines of scarification are then made the whole length of the urethra, either with the Paquelin cautery, or preferably the fine cautery knife, two lateral, and one upon the anterior and posterior walls. This will produce four linear cicatrices which effectually correct the condition.

**Urethrocele.**—This is frequent in elderly women. It consists in a pouching downward of the urethra, and is usually accompanied by narrowing of the external meatus. Hence urine accumulates in the pouch, decomposes, and sets up an irritative urethritis. The urethral canal should be cocainized. Cocaine is next injected into the tissue of the dilatation and a stout sound introduced into the urethra. An elliptical piece is cut from the urethra, taking in all of its coats except the mucous. The edges are then approximated by silver wire in an antero-posterior line, and the meatus is thoroughly dilated. The dilatation may have to be repeated.

**Urethral Condylomata.**—They are due to lack of cleanliness and have the same characteristics as similar growths on other parts of the vulva. They appear as warty excrescences, are firm, covered by epithelium, are pale, and usually pedunculate. They give rise to no special symptoms. If attached by a broad base they should be excised, and the wound closed by sutures; if by a small pedicle, they may be burned off by the Paquelin cautery. Small growths require the use of cocaine only, larger ones necessitate general anaesthesia.

**Urethral Cysts.**—These are cysts of retention formed within occluded follicles. They cause no symptoms other than slight ardor urinæ and dysuria. A urethral cyst may be punctured, incised, or extirpated, according to its size.

**Urethral Polypi.**—Sarcomata, fibromata, and myomata are among the rarer forms of urethral disease, and need no special

description. They are mentioned merely to call attention to the possibility of their existence.

**Cancer of the Urethra** is exceedingly rare. It occurs as an epithelioma of the urethral orifice or as a cancerous infiltration of the urethral tube. When found in the first situation it is readily removed, and with success both immediate and remote. But when found in the walls of the urethra recurrence after removal is exceedingly rapid. The *symptoms* are those of urethritis: frequent painful urination, discharge of blood and pus, later incontinence of urine, etc. In the epithelial type of the disease bleeding and discharge early accompany the ulceration; while in carcinoma of the urethral tube dysuria from obstruction is a marked symptom.

The *diagnosis* is readily made. The presence of a growth which is exceedingly friable, bleeding to the least touch, having a hard infiltrated base and rapidly extending, are the differentiating features of cancer. Most of the patients are over fifty years of age.

As long as the involved tissues are not attached to the pubic bone but remain movable, extirpation should be practised.

*Operation.*—This is applicable to malignant neoplasms, and should include all walls of the urethra. At a point above the growth sufficiently high to guard against recurrence the surgeon cuts transversely through the vagino-urethral septum. A sound in the urethra will act as a guide and fix the tissues. After the urethra has been entirely cut across an elliptical incision is carried downward from each end of the transverse cut to the side of the meatus. Removal of the tissues thus circled is more readily made from above downward, and traction upon the urethra by tenacula will facilitate dissection of the urethra from the pubis. The bleeding is very active but from small arterial trunks, branches of the external iliac artery. Each should be seized and ligated by very fine catgut. The severed urethra will now be found to be at the bottom of a deep wound and opening into the vagina. An attempt must now be made to draw out the urethra and fold in the vulvar edges of the incision so that the two will meet. This is first done with the anterior portion of the vulvar incision, this area being the most movable. The approximation of the lateral edges to the urethra is more difficult, and may be facilitated by removing the loose fat lying beneath the cutaneous edges of the incision. Silver wire is the preferable suture material, as it does not become



infected by the discharges. The patient should not be allowed to void urine, but a small catheter must be used once in three hours to empty the bladder for the first two days at least. Dry boric-acid powder dusted over the field of operation will prevent excoriation. After this operation the urethra will open beneath the pubic base, and the patient should always be careful to separate the labia whenever urinating, and to exercise scrupulous local cleanliness.

**Dilatation of the Urethra** is not infrequent. It is produced by rough intra-urethral instrumentation, by coitus through the urethra, and by labour. The circular fibres of the urethra are either ruptured or so stretched that they no longer contract. The digital exploration of the bladder and removal of vesical stones cause some of the lesions, but by far the greater number result from labour. In his eagerness to save the perinæum the accoucheur crowds the occiput up against the symphysis, and as the head is forced down it pushes before it the urethra. As a result not only are the circular fibres torn, but the urethra may even be detached from the pubic base.

The one cardinal symptom is incontinence of urine, either occasional, upon effort, or constant. The orifice of the urethra is not rounded or oval, but is usually a bilateral slit.

*Treatment.*—A soft, air-filled rubber ball of size sufficient to press the urethra against the pubis may be inserted into the vagina each morning. This failing to afford satisfactory relief, a considerable area of the urethro-vaginal septum must be resected, and the raw surface so sutured as to throw up into the lumen of the urethra a marked longitudinal fold when the stitches are tied. It is not necessary to enter the lumen of the urethra, although I have resected even that without detriment, and effected a cure. Silver wire is the proper suture material.

**Urethral Stricture** is found at any point of the urethra, but most often at the meatus. Carcinoma, scars from venereal ulcers, repeated attacks of gonorrhœa, may all cause stricture; but by far the greater number of strictures at the meatus are of unknown origin. When due to cicatricial tissue, the *treatment* is by dilatation, or incision followed by dilatation. This treatment can be conducted under cocaine. Stricture due to cancerous infiltration should be let alone. When retention of urine due to a close stricture renders the continuous use of the catheter necessary, an artificial vesico-vaginal fistula must be made and kept open.

**Cystitis.**—This is caused in about 60 per cent of cases by a bacillus of the colon group (*Bacillus pyogenes*, or *Bacillus coli communis*, or *Bacillus aerogenes*, as called by different authors); next in frequency as a cause is the gonococcus; then the tubercle bacillus, and others less frequently. The infections are rarely pure, being usually mixed, and any or all of the pyogenic cocci may be associated with the three chief causes I have given. The predisposing causes are constipation, retention of urine, inability to empty the bladder completely, trauma, as labour or instrumentation, long exposure to cold, and any condition which will mechanically injure the bladder or reduce its vitality. The causative germs may enter through the urethra by the blood or from adjacent organs. The disease may be limited to the trigonum, its most frequent site, or occupy the peritoneal segment of the bladder, or the pubic segment, or it may involve the entire organ. Tuberculosis of the bladder will be separately described. The exanthematous fevers may also cause cystitis, which in later years will produce "contracted bladder."

In *acute cystitis* the inflamed area is deeply injected, swollen, and petechial hæmorrhages may occur. The epithelium is covered by pus cells. The process may cease naturally or become chronic. In *chronic cystitis* the rugæ are adherent in many places, the mucosa is pale and thickened, or injected and presenting superficial ulcers with escape of blood. The process may be limited to the mucosa or extend to the submucosa, with the production of abscesses (*parenchymatous cystitis*), and greater or less portions of the mucosa may be exfoliated. The urine is turbid, contains pus, epithelium, blood-cells, possibly clots and gas bubbles.

**Symptoms.**—In the *acute* stage there are frequent and painful urinations; vesical tenesmus both before and after urinating; pain over the pubis and sensitiveness to pressure may be present, and the passage of the catheter gives great pain. The patient has to rise many times during the night, and broken rest adds to the depreciation in health. Most cases recover from the acute stage and pass into the *chronic*. Frequent urination is then the most marked symptom. The patient rises a certain fixed number of times each night because the bladder will retain but a limited quantity of urine. In the acute stage the irritability of the mucosa compels frequent evacuations, and the exfoliation of epithelium allows the approximated rugæ to adhere. As a result the bladder is held in a

condition of permanent contraction, it cannot distend beyond a certain point, and the muscular walls present a thickened appearance. THE FULL RECOGNITION OF THIS RESULT OF THE INFLAMMATION IS OF THE UTMOST IMPORTANCE WHEN WE CONSIDER THE TREATMENT. The inflammatory process may extend up into the ureters, one or both, and then into the pelvis of one or both kidneys. This upward extension is most likely in gonorrhœic and streptococcic infection, and least often seen in colon bacillus cystitis.

*Diagnosis.*—It is not only necessary to determine the degree of the involvement, but also its exact nature and, if possible, detect the causative micro-organism. This precision may be postponed until after the symptoms have subsided, but may be necessary during the acute stage. A careful examination of the genitals should be made to detect gonorrhœa of other structures. A chemical, microscopic, and bacterial examination of the urine is necessary, and the urine measured for a day. By means of cystoscopy the exact condition of the vesical mucosa can be determined.

*Treatment.*—Acute cystitis is not to be “let alone,” but should be actively though intelligently treated. The *pain* is to be relieved by tr. hyoscyami,  $\mathfrak{m}$  xxx q. 6 h., with possibly a little laudanum. The urine is rendered sterile by the internal administration of urotropin, cystogen or large doses of benzoate of soda, in order to limit the likelihood of extension of the disease into the ureters. Concentrated urine is irritating, therefore large quantities of water should be taken. The local treatment is most important. The urethra should be cocainized by injecting into it a 4-per-cent solution of cocaine by means of a slender curved syringe. The syringe is introduced to the bladder neck, and the injection is made along the urethral track as the syringe is withdrawn. In five minutes a soft catheter can be painlessly introduced into the bladder, and the bladder washed with a 1-to-32 solution of borolyptol or 1-to-20,000 formaldehyde solution. The bladder should be filled to the point of tolerance, but not distended beyond this, so as to unfold all the rugæ which, when adherent, retain the pus; this solution is allowed to run out, more is injected, and this allowed to escape. The washing is preferably conducted with a funnel and rubber tubing, which apparatus enables the operator to note the speed with which the fluid enters, and the bladder should be very gradually distended to guard against spasm. The procedure is to be carried

out twice a day IRRIGATION THROUGH A DOUBLE CATHETER IS WORSE THAN USELESS OWING TO THE RUGOUS FORM OF THE BLADDER WHEN CONTRACTED.

**Chronic Cystitis.**—This is rarely general over the entire bladder mucosa, but is generally limited to the trigonum and uterine segment. The involved area may be injected, the vessels standing out prominently, and occasional spots of pus may be seen. If ulcers are present they are usually very small. Or the mucosa may be unusually pale, irregularly ridged by bands of connective tissue in the submucosa, and the rugæ may be seen adherent in places. This form is more a sequela than a type of inflammation. The chief symptom of the true chronic cystitis is the necessity for frequent urination and urgency in the desire. The urine will contain pus and occasionally blood. Microscopically we find bladder epithelium, bacteria, pus, and blood-cells. There is no acute pain, and unless the bladder be contracted the patient may not have to rise at night to urinate. Even pressure upon the bladder may fail to develop sensitiveness, but intravesical instrumentation is painful. If the bladder be contracted the patient must empty it frequently. This contraction may be so great that the organ will receive not over an ounce of fluid. In such an extreme case the patient will be found to have enuresis while asleep. One case I had was a young lady who had contracted a cystitis from scarlatina, which resulted in this form of shrunken bladder. She carried with her wherever she went her own rubber, sheets, and linen, and slept throughout the night to awaken each morning in a pool of urine. She was entirely cured by treatment. No greater distress can be imagined than that accompanying an extreme degree of contraction in the bladder. Every case of chronic cystitis should be subjected to a thorough cystoscopy for the purpose of accurately estimating the extent and character of the lesions. If ulcerations are seen they should be touched with nitrate of silver. In all cases the bladder should be washed out once or twice a day with an appropriate solution, preferably formaldehyde (1 to 20,000), the sensations of the patient governing the amount. If the bladder be contracted, progressive dilatation must be practised. To secure this, each day a greater amount of fluid must be inserted. The daily gain may not be much over  $\frac{1}{2}$  an ounce, but the treatment must be persisted in until the bladder will retain at least 12 ounces. When no active inflammation exists it is not necessary in securing dila-



tation to use any strong antiseptic. In such a case saturated boric-acid solution or saline solution is best. By far the preferable apparatus is the graduated glass funnel, rubber tubing, and soft catheter. The bladder should never be distended by a bulb-syringe, because the pressure cannot be accurately governed nor the amount injected measured. Besides, it is difficult to sterilize a bulb-syringe. As the adherent rugæ separate a little blood may be produced. Old women who have contracted bladders cannot be trusted to determine the degree of distention by their sensations, for they are particularly indifferent to pain. Distention up to 8 ounces at the first sitting is sufficient. This treatment is not applicable when the bladder walls are disintegrated by either carcinoma or the caseous type of tuberculosis, and the possibility of such conditions must be eliminated before the treatment is begun. This method of treating chronic cystitis renders it unnecessary to form an artificial vesico-vaginal fistula.

**Exfoliative Cystitis.**—Any condition which shuts off the circulation of the bladder may cause sloughing of the mucosa. If the bladder be enormously distended such a result may follow; or if the uterus becomes suddenly retroflexed, or pressed upon by a tumour, sloughing may result. The symptoms are great pain, fever, bloody urine, shreds of tissue in the urine and pus. The pain must be relieved by opiates. Careful watch is to be kept lest the shreds of tissue block the urethra and cause overdistention of the bladder. The loose tissue is to be picked and cut away, and the bladder kept clean by repeated irrigations with boric acid, *not* accompanied by distention. The cause of the condition must be removed.

This is the form of cystitis which is sometimes seen to accompany the profound systemic infections, such as septicæmia, typhoid, scarlatina, and measles.

**Tumours of the Bladder.**—The most common form of primary growth is the *papillomatous fibroma*. It is a papillary growth, usually pedunculate, covered by thick epithelium, and commonly springs from the uterine segment. The growth arises from the mucosa, does not invade the submucous structures, and is commonly single. It is very vascular and bleeds easily. It may be found at any age. The mobility of the growth can well be appreciated in an examination through the cystoscope. When the diagnosis is clear, the growth should be removed by a curette forceps which will pinch out a bit of the mucosa from which the growth

springs. It must not be forgotten that bladder cancer occasionally assumes the form described.

Among the rarer bladder tumours may be mentioned dermoid cysts, myomata, fibromata, sarcomata, and carcinomata.

*Carcinoma* of the bladder, when primary, assumes, as a rule, the papillomatous type, rarely presenting necrotic ulcers due to breaking down of infiltrated spots. The readiness with which such growths bleed and their exceeding friability easily distinguish them. Furthermore, they are nearly always multiple. Cancerous extension to the bladder from the uterus usually first manifests itself as a submucous nodular infiltration about the trigone.

*Symptoms* due to vesical tumours: Pain is not often present unless a severe degree of cystitis coexists or blood-clots form in the bladder. Urgency and frequency in urinating are common symptoms. Hæmorrhages into the bladder are common in cancer, and occasional in papilloma and fibroma. There may be small clots which become decolorized, or a large clot may form and be sufficient to block the urethra.

If the growth is large enough, or situated near the urethra, it may produce suppression. The *diagnosis* is made by direct cystoscopy, urinalysis, and examination of specimens of the tumour, which should be removed through the urethroscope.

The *treatment* is dependent upon the nature of the growth. Any non-malignant growth capable of passing through a 32 F. cystoscope should be removed that way. Larger tumours can be taken out through a vaginal incision or a suprapubic operation, the size determining. Malignant tumours of the bladder, in which the disease is localized in that organ, demand its total extirpation with implantation of the ureters into the vagina.

**Ureteritis.**—*Acute.*—Any of the pus-producing organisms may cause it as well as the tubercle bacillus. It is due most often to an extension from the bladder, but may be an inflammation descending from the kidney or originating in the ureter at some point damaged by trauma, as by a calculus. The mucosa of the ureter becomes swollen, reddened, and the epithelium is exfoliated. Pus is produced in abundance. After a time the submucous walls of the ureter become thickened and may remain so. The urine escaping through the affected ureter may contain pus, bacteria, epithelium, and blood.

*Symptoms.*—The extension of an infection upward from the bladder is often ushered in by a chill. The temperature rises rapidly and the course of the ureter in the pelvis is markedly sensitive. This symptom can be elicited by vaginal or rectal palpation. If the inflammation be due to a calculus the symptoms will be those of stone in the ureter rather than of inflammation, because this latter is of gradual onset. If the ureteritis be due to a downward extension of a pyelitis the symptoms of the two conditions are indistinguishable. Upon making a cystoscopic examination the orifice of the affected ureter will be seen to be œdematous, inflamed, and the urine discharged will be purulent or bloody.

In *chronic ureteritis* the fever is irregular or entirely wanting. Pain in the affected side is constant, and there is more or less ardor urinæ. The urine contains ureteral epithelium, pus, and often blood. In all cases of ureteritis a careful bacteriological examination should be made of the urine so as to determine the direct cause of the disease. In all cases of general acute ureteritis, and in some of the chronic forms, a mild leucocytosis is present.

*Diagnosis.*—In the acute form this is often difficult. If occurring on the right side the case may be interpreted as one of appendicitis, an error which is particularly easy, as leucocytosis exists in both conditions. But a careful analysis of symptoms, the exhaustive examination of the urine, the presence of vesical symptoms, the absence of abdominal rigidity and sensitiveness, and the presence of ureteral sensitiveness, will enable the observer to exclude most of the diseases for which ureteritis may be mistaken.

*Treatment.*—Acutely inflamed ureters are not to be touched. The patient is to be given sufficient opium to allay pain. The urine should be rendered sterile as far as possible by the administration of urotropin for some days. If acute cystitis exists, as is usually the case, this must be energetically treated. The ureter has a particular resistant power against germs, and will usually recover if the causative cystitis is cured. The bowels are kept empty so as to avoid pressure by scybalous masses.

After ureteritis has become chronic an effort must be made to effect a radical cure. As a first step it is essential to determine which ureter is involved, or whether both are. Under cocaine the ureters are to be catheterized with the utmost care by means of direct cystoscopy. The catheters are introduced only into the pelvic portions of the ureters. The relative speed with which the two

kidneys functionate, as well as the gross appearances of the specimens, can be noted in half an hour. The catheters are then withdrawn and the bladder irrigated with formaldehyde, 1 to 20,000. A dose of 10 grains of quinine with a grain of opium will tend to prevent a chill and quiet the patient. A careful chemical and bacteriological examination of the specimens is now made. If the ureteritis be due to streptococcus it will usually be found associated with pyelitis. If due to the colon bacillus it is often primary but also accompanies renal calculus. If due to the gonococcus it rarely extends to the kidney. In all forms of chronic ureteritis a cure cannot be effected unless the coexisting complications in bladder or kidney be overcome. If the ureter remains inflamed after the kidney and bladder are rendered normal, it should be washed out once in three days with boric acid, which is substituted, as soon as the catheterization of the ureter is found to be free from risk, by borolyptol, 1 to 40. Irrigation of the ureter is a most difficult and technical procedure, and is not to be attempted by every one. As a rule the attendant will content himself with curing a possibly infected kidney or bladder, and indirectly treating the ureter by agents which sterilize the urine. **IN CONSIDERING URETERITIS, IT MUST NOT BE FORGOTTEN THAT IT IS RARELY PRIMARY.**

If the kidney be riddled by pus so as to demand removal, the ureter also is to be taken away or a sinus may form.

**Stricture of the Ureter.**—This is nearly always limited to that portion which passes through the true pelvis. Furthermore, it is most often in the vesical wall that we find such strictures. It may be due to tuberculosis (described later) or neoplasm of the ureter, but true stricture is generally the result of ureteritis or peri-ureteritis. As a result of such stricture a hydro-ureter or pyo-ureter may develop. The affected ureter is to be gradually dilated through a cystoscope by the introduction of graduated whalebone bougies. Peritonitis and parametritis may produce bends or obstruction in the ureter. Given a history of peritonitis or puerperal sepsis and obstruction of the ureter through which the smallest ureteral catheter cannot pass, peri-ureteritis with stricture may be diagnosed, and is to be relieved by laparotomy.

**Cystoscopy** (Fig. 11).—The bladder may be examined by indirect illumination or by direct, the latter being preferable. This may be done either by means of the male cystoscope, in which case the bladder is distended with water, or by the female cystoscope. Of



all methods the one giving the greatest satisfaction is that which makes use of distention by air. This may be accomplished by *forcing* the air into the bladder; but emphysema has been known to follow this procedure, and treatment of the bladder is impossible, as this method is possible only with a closed cystoscope. Posture



FIG. 41.—THE AUTHOR'S METHOD OF DIRECT CYSTOSCOPY, WITHOUT THE USE OF MIRRORS OR HEAD LAMPS.

should be employed to distend the bladder, so that the air is *drawn* into the dilating organ. The bladder is emptied by a catheter. The patient is placed in the knee-chest posture, and the cystoscope of Kelly introduced. Immediately the bladder distends, the rectum seeks the curve of the sacrum, and the anterior wall of the vagina does the same. This latter fact militates against the ready inspection of the ureteral orifices and catheterization of the ureters. When this is found to be the case a light vaginal tampon of cotton should be employed to hold up the anterior vaginal wall. The bladder is illuminated by a head mirror or forehead lamp. The

author's method is the following: The bladder is emptied by catheter. The patient is then placed on the back with the thighs flexed on the abdomen. The author's cystoscope is then introduced and the table lowered into Trendelenburg's position. If the clothing be loose, the bladder immediately distends with air. Upon turning on the electric current the bladder at once becomes illuminated as illustrated. The entire organ may be inspected by turning the instrument; intravesical operations and applications may be made, foreign bodies removed, and the ureters readily catheterized. The larger cystoscope corresponds to the 30 F. scale. Its use necessitates cocaine and dilatation only where stricture exists. After the manœuvre the bladder is washed out with borolyptol (1 to 32) solution.

**Catheterization of the Ureters.**—This is done for the purpose of securing separate specimens of urine for examination, and is a most valuable aid in diagnosing ureteral and renal disease. It should never be employed when the bladder or ureters are acutely inflamed. The fine flexible catheters of Kelly are sterilized by boiling three minutes in plain water, or preferably by formalin gas. The small cystoscope is introduced and the bladder distended as just described. One ureter is found and the catheter passed for about 4 inches. The cystoscope is then withdrawn and reintroduced alongside the catheter, the other ureter found and a catheter passed into that. The cystoscope is finally removed, and the patient carefully placed in bed so as not to disturb the catheters. The catheters are now inserted into test-tubes the orifices of which are loosely plugged by absorbent cotton, and the tubes held tilted up by a roll of cotton. After sufficient urine is secured, the catheters are removed and the bladder is washed out. It is well to use catheters of different colours so as to know into which ureter each is inserted, and the test-tubes are to be marked "right" and "left," to designate the ureters from which the specimens were drawn.

**Tuberculosis of the Bladder.**—This may be primary, due to an introduction of the bacilli through the urethra, in which instance the trigone is first invaded; or be secondary to a renal tuberculosis which has extended downward, and then the first evidence of involvement of the bladder will be about a ureteral orifice. The disease may begin as a miliary type, the affected area being studded with minute round elevations of light colour and covered by epi-

thelium; or start as a cellular infiltration of the deeper layers of the mucosa, forming caseous spots. These latter break down and produce ragged ulcers. The process may invade all the walls of the bladder or be confined to one spot. As the disease spreads the bladder-walls contract, so that the capacity of the cavity may be less than an ounce. In the early stage the urine will contain epithelium and pus, but when ulceration begins blood in quantity is produced. The disease may occur at almost any age, is sometimes acute, but usually assumes a chronic type. The bacilli of tuberculosis may usually be found in the urine, or can be secured by curetting a small area of an ulcer through the cystoscope; but occasionally the urine will show its character only when injected into the peritoneal cavity of the guinea-pig. About 10 per cent of all cases of cystitis are due to tubercle bacilli.

*Symptoms.*—Pain on urinating is the first symptom and is of a stabbing character. The patient urinates more frequently than usual, and may notice a sediment of pus and mucus in the urinal. Hæmaturia is a common symptom, the blood being in large quantities or appearing as small pale clots. There is loss of weight and general weakness. The temperature may be continuously high or rise only in the evening. The pulse conforms to the temperature and general strength. Upon cystoscopic examination the miliary tubercles or ulcerations may be seen. It is always advisable to catheterize both ureters through the cystoscope, thus securing separate specimens from the two kidneys for careful bacteriological examination. It is important to determine whether the kidneys are involved.

*Treatment.*—This cannot be intelligently carried out unless not only a diagnosis of the cause of the cystitis be found, but also the limitation of the invasion be determined. In miliary tuberculosis of the bladder, the best treatment is found in washing the bladder out once each day with an aqueous solution of metallic iodine in strength of 1 to 5,000, or even 1 to 30,000. In doing this the bladder cavity is to be distended with fluid and the solution is to be retained some minutes if possible. Or an emulsion of iodoform in any bland oil may be injected into the bladder in 10- to 50-per-cent strength. If small ulcers are seen, they should be curetted and touched with pure tincture of iodine or with 20-per-cent nitrate-of-silver solution. Frequent irrigations with boric acid or formalin (1 to 10,000) are to be employed between the

applications. If the ulcers are large or numerous, so as to preclude the general curettage of the bladder, the irrigations with iodine solutions are to be used.

When the entire bladder is involved and the kidneys normal, removal of the bladder and implantation of the ureters into the vagina is to be considered.

**Tuberculosis of the Ureter.**—This is nearly always secondary to a renal tuberculosis. The disease manifests itself in the formation of caseous granulomatous masses. The entire ureter is thickened and adherent to the adjacent structures. The symptoms are those of chronic ureteritis. There is a profuse production of pus admixed with which we often find much blood. As primary tuberculosis of the ureter is unknown, the symptoms are masked by those of the causative disease. The only *treatment* which gives any hope of cure is removal of the entire ureter, of course with the kidney. The ureter may be removed either through the long loin incision of Howard Kelly, and the stump of the ureter turned into the vagina through an incision at the vaginal vault, or through a transperitoneal incision. The latter operation I prefer. An incision is made in the linea semilunaris (Langenbeck's incision)

and the peritonæum severed. The incision extends from the level of the eighth costo-vertebral joint to the pelvic brim. After the kidney is removed and the ureter tied close to the kidney, the ureter is freed by blunt dissection and with great care so as not to wound the colica vessels. It is safe to incise the peritonæum where the ureter crosses the pelvic brim, so as to assist in freeing the ureter from its attachments above the pelvis. In the pelvis it is necessary to dissect out the ureter down to its insertion into the bladder until it can be drawn up in front of the uterine artery. It is then cut off. A probe with an eye is passed through the stump into the bladder and out of the urethra. A suture is passed



FIG. 42. — APPEARANCE OF THE VESICAL END OF THE URETER SIX MONTHS AFTER IMPLANTATION OF THE URETER INTO THE BLADDER, IN A CASE OF EXTIRPATION BY LAPAROTOMY OF THE CANCEROUS PELVIC ORGANS.

through each side of the ureter and into the eye of the probe, then tied. An assistant draws down upon the probe and thus inverts the ureteral stump into the bladder. A few sutures



then suffice to close over the depression in the bladder-wall, the peritoneal edges are sutured, and the abdomen closed. The presence of the probe in the bladder in no way interferes with the passage of the catheter; and in a few days the sutures which were used to invert the ureter cut their way through and the probe can be removed. The bladder after this operation is daily washed with formaldehyde (1 to 10,000), or aqueous solution of iodine (1 to 10,000), until a cystoscopic examination shows that the stump of the tubercular ureter has sloughed away.

**Vesical Calculus.**—Stone in the female bladder sometimes results from an enlargement of a small calculus which has dropped into the bladder from the ureter; but most of them have as nuclei a bit of cotton, a catheter end, a hair-pin, or a piece of chewing-gum (Fig. 43). Ligatures employed in intraperitoneal operations, or in the vagina, may wander into the

bladder and be nuclei for calculi. The *symptoms* are those of cystitis. If the stone be sharp or the foreign body have a cutting edge, blood will be produced. Frequent and painful urination, the presence of pus and blood in the urine, will suggest an examination. Unlike other forms of cystitis, patients with calculi are more comfortable with a moderately distended bladder. The bladder is most painful when empty. The foreign body may be felt if large by vaginal examination, or give out a distinct "click" when a sound is introduced. Cystoscopy will easily show the calculus and determine its size and form. The *treatment* embraces the removal of the calculus and cure



FIG. 43.—A CALCULUS FORMED AROUND A HAIR-PIN WHICH HAD ESCAPED INTO THE BLADDER.

Removed by vagino-vesical section.



FIG. 44.—THE HEAD OF A SELF-RETAINING CATHETER, BROKEN OFF IN ITS REMOVAL AND ENCRUSTED BY CRYSTAL OF URATES.

The presence of this foreign body was not confessed until three weeks after the accident. (Enlarged twice.)

will easily show the calculus and determine its size and form. The *treatment* embraces the removal of the calculus and cure

of the cystitis (Fig. 44). Through the large cystoscope most calculi can be broken up and removed. Those too hard or too large for this can be removed by vaginal cystotomy or suprapubic cystotomy.

**Ureteral Calculus.**—These are but stones which have passed from the kidney. Most of them are formed of urates. Occasionally a foreign body like a ligature will enter the ureter and form the nucleus of a stone. As soon as the stone enters the ureter an attack of renal colic sets in. The agonizing pain shoots downward into the bladder along the thigh and groin. The pain is constant, with most distressing paroxysms. A rigor often starts an attack, and during it vomiting, profuse sweating, and incontinence of urine occur. The urine is generally bloody. An attack may last for hours and be many times repeated, or may suddenly disappear. Cessation of the pain does not necessarily denote escape of the stone into the bladder; it may merely have passed into a little more dilated portion of the ureter. If the stone is in the pelvic portion of the ureter it may be felt by vaginal or rectal touch. If situated higher up, it may be felt with a whalebone ureteral bougie passed into the ureter through a cystoscope or by Kelly's wax-tipped bougie. The stone may be passed or become impacted. After an attack of renal colic has ceased, a careful search for the stone either in the urine or bladder should be made. If another attack occurs and the stone has not been found, it is probably impacted. It is then necessary to try to locate the point of impaction. As a rule the impaction is below the pelvic brim. Impaction conduces to hydronephrosis, pyonephrosis, and death. Or local ulceration may occur, the ureter be perforated, and death ensue from septic peritonitis. An impacted stone may remain for a long time without producing serious symptoms, or may cause menacing symptoms soon after becoming fixed.

*Treatment.*—During the attack of colic the pain is to be relieved by large doses of morphine. If the stone becomes impacted in the abdominal portion of the ureter, it is to be removed by a loin incision. If it is impacted in the pelvic ureter, transperitoneal uretero-lithotomy is indicated. After exposing the ureter the stone should, if possible, be shoved a little away from its point of lodgment, where in all probability an ulcer has formed, before the ureter is incised. The ureter should be incised parallel with its course, and after the stone is removed the incision closed by fine

interrupted sutures. Occasionally a stone will lodge in that portion of the ureter which crosses the vagina, and it can then be removed by vaginal incision. In all cases of ureterectomy for stone, a long flexible ureteral catheter should be passed down the ureter and out of the urethra, to insure free escape of the urine while the incision in the ureter is healing. It can be removed in three days.

## CHAPTER VI

### *TUMOURS OF THE PAROVARIIUM AND OVARY*

**Parovarian Cyst** (Fig. 45).—This arises from the remains of the parovarium. The cause is unknown, and it may be found at any time of life. It is essentially intraligamentary; but when it begins in the outer part of the parovarium and evolves towards the abdominal cavity it may become pedunculated. As it spreads apart the folds of the broad ligament it infringes upon the side of the uterus and becomes sessile upon it. It may grow to such size as to lift the peritonæum up from the pelvic floor and lateral pelvic walls, in which case it may have the ureter coursing over its anterior face. It displaces the uterus laterally, and presses upon the bladder and rectum. The Fallopian tube is stretched over the cyst and the ovary thinned out, but the ovary can still be detected as a separate organ.

The fluid contained is usually straw-coloured, limpid, and of low specific gravity (1.002). The cyst is lined by cubical or cylindrical epithelium, often ciliated. The cysts are almost always monocystic, rarely multiple, have very thin walls, and are translucent. Only occasionally are these growths papillomatous, in which case their contents may be blood-stained. They are of exceedingly slow growth.

*Symptoms*.—They are merely those of a mass pressing upon the pelvic organs and disturbing their functions, or even causing abdominal enlargement. There is no disturbance of the uterine functions.

The diagnosis is based upon the presence of a tumour which is symmetrical, and upon palpation is very elastic and devoid of semisolid portions. Vaginal examination shows, as a rule, that the tumour is intraligamentous, sessile upon the uterus, displacing that organ laterally.





FIG. 45.—A PAROVARIAN MONOCYST ASSOCIATED WITH A BEGINNING PROLIFERATING MULTILOCULAR CYST OF THE OVARY. Note the presence and relations of the Fallopian tube. The tumour grew from the outer pole of the parovarium and was therefore pedunculate. The patient was aged fourteen and had been in a maternity for several months, the physicians thinking her pregnant.

**Treatment.**—The tumour should be removed by laparotomy as soon as discovered, as its tendency is to grow and interfere with pregnancy, cause obstruction of the ureter, etc. Hanging from these and other tumours, as well as from the normal tube, may often be seen a small, thin-walled cyst attached near the fimbriated end of the tube. This is the *hydatid of Morgagni* which forms at the end of the longitudinal canal of the parovarium. It produces no symptoms and calls for no treatment.

**Hydrocele of the Round Ligament.**—This is a sacculated serous accumulation under the peritonæum of the round ligament. It is due to Alexander's and other operations on the ligament, or to unknown causes. It produces no symptoms. It is found accidentally when the abdomen is opened for other reasons, and is to be treated by merely evacuating the fluid and excising a portion of its peritoneal sac.

**Ovarian Glandular Cyst.**—It arises from the true ovarian stroma. It is always multilocular, or has been so. True ovarian cystoma, which appears unilocular, may, upon close examination of its interior, be found to present trabeculæ which are the remains of former partitions, or upon being inspected before a light will show secondary smaller cysts still in the main wall. The cyst is either proliferating glandular or proliferating papillary.

**Proliferating Glandular Cyst** (Fig. 46).—This reaches an enormous size, frequently over 100 pounds. Owing to the aggressiveness of modern surgery and the diffusion of knowledge, they are usually discovered and removed now before reaching such a size.

The tumour arises from the glandular portion of the ovary, not from the hilum. It is lined by cubical epithelium which, as the intracystic pressure increases, may become exfoliated, leaving the fibrous internal coat of the cavities bare of epithelium. The fluid contained in the cyst is of high specific gravity (1.020), ropy, and gelatinous. It may be clear, yellowish, claret-coloured, or greenish. Crystals of hæmatin and cholesterin are found, and the fluid contains much pseudo-mucin, a characteristic element. Pseudo-mucin is not found in the fluid of normal ovaries, in cystic ovaries, or in parovarian cysts. Occasionally it occurs in the fluid of papillary cysts. The growth of the cyst is due to proliferation of the lining epithelium and epithelial secretion. The tendency to ovarian cystoma is probably congenital. There is undoubtedly a tendency in the disease to occur bilaterally.

**Papillomatous Ovarian Disease** (Fig. 47).—This may assume the form of papillomatous growths on a glandular ovarian cystoma; or papillomatous parovarian cystoma; or dropsy of a



FIG. 46.—TRUE PROLIFERATING GLANDULAR OVARIAN CYSTOMA.

Note the depressions between the clear cystic portions of the growth, representing the points of attachment of the partitions between the cysts. The mass weighed 65 pounds.

Graafian follicle with papilloma; or papillary adeno-carcinoma; or papillary adeno-sarcoma. The papillary growth occurs on the non-cystic as well as the cystic growths. The disease is bilateral in half of the cases. It is malignant, in that the papillomata have a tendency to become spread over the entire peritonæum both by the solid parts of the growth and by means of any fluid which may escape from the cystic papillomata. In addition to this certain of the papillomata are true carcinomata and sarcomata. The papillomatous buds within a cyst have a thinning effect upon the cyst-wall, and in time may protrude through the wall and appear upon the surface of the growth. Papillomata have occurred along the track of a trocar puncture after tapping such a cyst; on the vulva after vaginal removal; and secondarily in the abdomen after laparotomy, even when the original tumour was not cancerous.

Papillomatous cysts do not grow to the large size of glandular cystomata. The outcroppings in papillomata are made of an arborescent connective-tissue stroma covered by epithelium. The fluid contents of papillomatous cysts is usually dark-coloured from admixture of blood, and rarely contains pseudo-mucin. The cysts are usually multilocular, occasionally unilocular. The papillomatous cystomata spring from the hilum of the ovary or parovarium.



FIG. 47.—PAPILLOMATOUS OVARIAN CYST.

The papillary growths from the body of the ovary occur within Graafian vesicles, which are dropsical, or in fibroid, carcinomatous, or sarcomatous degeneration.

*Symptoms.*—There are no symptoms to distinguish papillomatous cysts from other cysts, or papillomatous solid tumours from other solid ovarian growths. When the papillomata have appeared upon the surface of the growth and invaded the peritonæum, there is more ascites with the small papillomatous tumours than with the simple glandular growths. And when the peritoneal involve-



ment has become pretty general, the papillomatous tumour is more fixed than would be a simple cyst of the same size. Papillomatous cysts grow a little more rapidly than do simple glandular cysts.

**Dermoid of the Ovary** (Fig. 48).—This interesting tumour is a cystic growth which contains hair, integument, bone, teeth, mucous

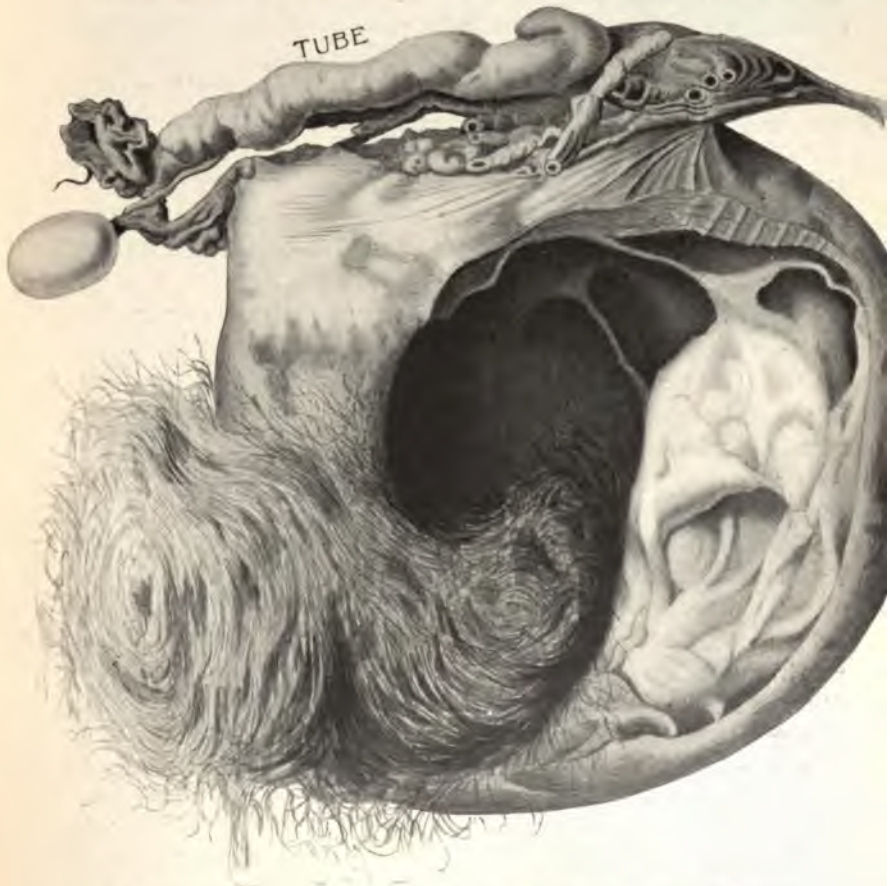


FIG. 48.—OVARIAN DERMOID AND SMALL CYST OF THE ORGAN OF MORGAGNI.  
The Fallopian tube. Hair. Cyst. Cartilage.

membrane, one or all. Sweat glands, mammary tissue, rudimentary heart and larynx have also been found in dermoids. It arises from ectodermal inclusions in the ovarian stroma. The walls of the cyst vary in thickness, and are lined by squamous epithelium.

The contents are cheesy or oily in consistence, due to the admixture of fat and sebaceous matter. The tumour is monocystic, usually not over 7 inches in diameter, and generally unilateral. It evidently begins to grow before puberty, when the uterus lies on the bladder, hence, unlike ovarian growths which start after puberty, it is often *anterior* to the uterus. A striking and inexplicable tendency in such tumours is to cause peritonitis even when they are small.

**Symptoms.**—As a rule, the cyst is firmer than a small ovarian cyst, and in about half of the cases lies in front of the uterus, while an ovarian cyst which is of size small enough to remain in the pelvis lies behind the uterus. There is also more pain and sensitiveness about dermoids than about other cystic tumours. Otherwise the symptoms are those of a pedunculate tumour attached to the uterine cornu.

**Symptoms of Glandular Ovarian Tumours.**—Ovarian cysts may attain a certain size and remain quiescent for years, but their tendency is to continuously increase from their beginning. This is particularly noticeable with the malignant and papillomatous growths, and these also produce more ascites than the other types. As the tumour grows out of the pelvis it drags the bladder up, compresses the rectum and ureters, and forces the uterus against the bladder. After the growth leaves the pelvis because that cavity can no longer contain it, it encroaches upon the abdominal viscera. The anterior and lateral abdominal walls are made to bulge outward, the viscera are forced upward, and respiration and nutrition are interfered with. The abdomen becomes enormously distended while the depreciated general health induces emaciation. The growth may reach a weight of several hundred pounds. Pressure symptoms, such as oedema of the limbs, supervene, the dyspnoea becomes so great that the patient cannot lie down, broken rest and malnutrition bring the patient to a state which renders her liable to pneumonia, from which, or nephritis, or sheer exhaustion, she dies. In the case of malignant growths metastases may form in other viscera. Early in the history of glandular ovarian cysts amenorrhoea in half the cases becomes a prominent symptom, and this is observed in the young as well as in those of middle life. It occurs before marked depreciation in general health ensues, and therefore can only be attributed to the influence of the growth upon the ovarian structure. It is found whether the growth be

unilateral or upon both sides. Parovarian cysts do not produce it.

*Diagnosis of Glandular Ovarian Cysts.*—If the tumour be pelvic it almost invariably and from the first occupies a position behind the uterus. As the tumour grows it lifts the uterus upward and forward, forcing the corpus uteri and bladder above the symphysis and the cervix against the neck of the bladder. If the tumour be so small as to float free in the pelvic cavity, it will be felt to one side of the median line and will not displace the uterus. There is little difficulty in detecting an ovarian tumour which is pelvic in its associations. It is always pedunculate, easily movable unless inflamed, insensitive to pressure, and will vary in consistence from the elastic bag of water which characterizes small cysts to the dense semisolid character of a large multilocular cyst. The tumour can be moved independently of the uterus, is easily displaced downward, and can be lifted no farther upward than the length of its pedicle. No ovary is present upon the side occupied by the tumour. In cystic growths fluctuation can always be elicited and elasticity detected. When the tumour has risen into the abdomen it drags the uterus upward, but does not pin it against the symphysis unless the tumour has a pelvic lobe.

It may resemble ascites. In *ascites*, as the patient lies upon her back the sides of the belly sag and the anterior wall flattens, while with a tumour an eminence shows under the anterior abdominal wall. As the patient breathes deeply the abdominal walls may be seen to move over a tumour; not so in ascites. The percussion note over a tumour is flat, while resonant areas extend over the abdomen enlarged by ascites. In ascites the lateral abdominal walls are flat, while in ovarian cyst they are resonant. Ascites is usually due to some renal, hepatic or cardiac disease the nature of which can be determined. Fluctuation may be elicited in ascites but disappears if the centre of the abdomen be pressed upon by the edge of an assistant's hand. Fluctuation persists even under pressure if the enlargement be due to an ovarian cyst.

*Pregnancy* upon superficial examination simulates ovarian cystoma. But the two conditions have in common but two symptoms, amenorrhœa and abdominal enlargement. In ovarian cyst the uterus is small and readily mapped out, and none of the symptoms of pregnancy are present except amenorrhœa.

Ovarian cystoma is movable, while cysts of the broad ligament

and retro-peritoneal cysts are fixed. The passage of a catheter will eliminate an overdistended bladder as a cause for the enlargement.

A *large cystic kidney* may reach into the upper pelvis. But the plane of displacement of such a growth is upward towards the free ribs, while the plane of displacement, under pressure, of an ovarian cyst is downward towards the true pelvis.

Faecal masses can be indented by the finger, and the depressions so made remain; they are less movable than an ovarian cyst, and are removed by cathartics and enemata.

*Caseous tubercular peritonitis*, that form which produces a mass of agglutinated intestines, enlarged mesenteric glands, and ascitic fluid, simulates very closely an ovarian cystoma. But such a tumour mass is fixed. In tubercular peritonitis the evening temperature is usually elevated, the pulse rapid, and cheeks hectic. Tubercular peritonitis causes a thickening in the broad ligaments and fixes the uterus. There are evidences of pelvic peritonitis which are not present in ovarian cyst. Abdominal pain is a constant and marked symptom of peritonitis, and is only occasional in ovarian cyst.

There is no difficulty in differentiating an ovarian cyst from hydrosalpinx, pyosalpinx, and other results of pelvic inflammation. These are acute in origin and are more fixed than the small cysts with which they may be confused. If the woman be very fleshy the outlines of an ovarian cyst may be hidden. In such a case the vaginal and rectal examinations must be most thorough, if necessary assisted by general narcosis. The differentiation between the various forms of ovarian cyst is, so far as it can be made, laid down under their several descriptions.

**Diagnosis of Solid Ovarian Tumors.**—These simulate pedunculate uterine fibroids, but are much more movable. The differentiation is difficult unless amenorrhœa is present. Ovarian sarcoma is of rapid growth, ovarian fibroma grows slowly. Neither produces uterine hæmorrhages, but amenorrhœa, and ovarian sarcoma causes much pain. Ovarian fibroid produces no pain.

If unable to make a positive diagnosis an exploratory incision may be made. On no account should the abdomen be punctured owing to the damage which might be done should the enlargement be due to pregnancy, or pus be present, or a papillomatous ovarian cyst or caseous tuberculosis. The exploratory incision does no



harm in any case, and can readily be extended so as to allow of a complete operation if it be found that one is needed and is possible.

*Degenerative Changes.*—An ovarian cyst is subject to degenerative changes both in its sac and contents. The sac may become calcareous either in part or wholly, and at points in it may be seen remains of Graafian follicles and old corpora lutea. Hæmorrhages into the walls of large tumours are frequently found.

Lastly, the cyst wall may be very oedematous and even present spots of necrosis. The fluid contents in the cyst may be blood-stained from rupture of vessels in the trabeculæ, or be purulent due to infection. A cyst may become attached to a knuckle of intestine and a false communication be established between the two. In that case the cyst will contain gases and fæcal matter. Owing to inflammatory changes on the periphery of its sac, the cyst may become attached to any abdominal viscus, even the liver and stomach.

If the *pedicle of an ovarian cyst* becomes suddenly twisted or strangulated the symptoms are rather acute. Either a hæmorrhage into the sac of the tumour may occur and be large enough to cause great shock or even death, or the strangulation may be so complete as to produce gangrene in the tumour. The symptoms of this accident vary with the degree of the strangulation. There is usually a sudden shock, accompanied by a most acute pain. The tumour suddenly becomes enlarged and tense and very sensitive. The patient may rally, but, as a rule, the lesions are progressive and either end fatally or are relieved by operation. The twisted pedicle has been known to become atrophied and the tumour be nourished by adhesions. Right-sided tumours rotate to the left, and tumours of the left ovary turn to the right. The cause of rotation is unknown. The changes which glandular ovarian cysts undergo have a most important clinical bearing. These changes are more often found in mature growths, occasionally in those of small size. Of all ovarian neoplasms we find that 27 per cent are either of a cancerous nature or of that malignant type which is clinically described as papillomatous. Therefore, the sooner an ovarian growth is surgically treated the better for the immediate and future condition of the patient.

Occasionally a *cyst will rupture*, either because of a blow or spontaneously owing to weakening in its walls. Small ovarian

cysts and parovarian cysts often rupture without producing any symptom more disagreeable than a temporary shock, the fluid being absorbed. Rupture of a dermoid is usually rapidly fatal. Rupture of a papillomatous cyst results in a diffusion of its peculiar structure over the entire peritoneal cavity and ultimate death from inanition. Ovarian glandular cysts when ruptured cause a limited or fatal degree of peritonitis according to the amount and character of the fluid they pour out. Whenever the pedicle of a cyst becomes twisted or the cyst ruptures, an immediate operation is indicated.

The relative frequency of the several varieties of ovarian tumour is represented in the following percentages: Adeno-cystoma, 43 + per cent; papilloma, 20 + per cent; adeno-carcinoma, 6 + per cent; sarcoma, 1 + per cent; fibroma, 2 + per cent; dermoid, 19 + per cent; and parovarian, 7 + per cent.

*Treatment.*—As soon as an ovarian cyst is discovered it should be removed. On no account should a diagnostic aspiration be attempted in view of the possible malignant nature of the growth. If the tumour proves carcinomatous, papillomatous, or sarcomatous, the opposite ovary should be removed. It is the author's practice also to ablate the uterus in cases of carcinoma and sarcoma, unless the pedicle be long and free from malignancy. Small tumours which can be removed unruptured through the vagina may be so treated. Larger tumours are to be taken through the abdomen. IN VIEW OF THE POSSIBILITY OF PAPILLOMATOUS OR OTHER FORM OF MALIGNANCY, OVARIAN TUMOURS SHOULD, IF POSSIBLE, BE REMOVED WITHOUT RUPTURING THEM. The increased

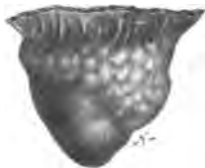


FIG. 49.—CYST OF THE CORPUS LUTEUM. GENERALLY CYSTIC OVARY.

length of incision to accomplish this in large tumours is more than compensated for by the certainty that no fluid can enter the peritoneal cavity, an accident hard to avoid when the tumours are tapped *in situ* for the purpose of reducing their bulk so as to pass a small opening. If it is intended to tap the tumour, very large ones can be removed through the vagina.

#### **Cyst of the Corpus Luteum (Fig. 49).—**

Occasionally a corpus luteum will not rupture and involute, but certain of its component parts will continue to grow. As a consequence, we have the ovarian stroma proper covering a yellow-

ish layer of wavy gelatinous material, and in the centre a blood-clot. The yellowish layer is loosely connected with the ovarian stroma. These cysts are perfectly innocent, and rarely reach a diameter greater than an inch. They cause much constant pain in the involved ovary, increase its size and weight, but do not



FIG. 50.—FIBROMA OF THE OVARIES.

*a*, fibroid of the left ovary in section; *b*, surface of the right ovarian fibroid; *c*, fibroid of the right ovary in section; *d*, surface of the left ovarian fibroid (Winckel).

conduce to peritonitis. They are rarely discovered except during operations for other conditions. When found they do not call for the removal of the affected ovary. The periphery of the growth should be incised parallel with the long axis of the ovary, the yellow layer peeled out by mouse-tooth forceps, the

resultant loose flaps resected, and one or two interrupted sutures of fine tendon applied to approximate the edges. The operation may be performed either through the abdomen or the vagina. I have observed that this condition is particularly common in women who have had post-partum or post-abortum sepsis of mild degree which resulted in pelvic peritonitis but no suppuration.

**Fibroma of the Ovary** (Fig. 50).—This is a dense enlargement of the ovary characterized by the ingrowth of connective-tissue elements which displace and smother the normal ovarian stroma. It is more a fibroid degeneration of the ovary than the formation of a distinct tumour. The growth looks like a sarcoma, but is markedly more firm. There is no pain, the growth is exceedingly slow, and the only local disturbance is the production of ascitic fluid in the pelvis. The tumour is either discovered accidentally or because the patient comes for advice regarding a movable "lump" in one iliac fossa.

**Varicocoele.**—The veins of the broad ligament may become enormously distended so as to form rounded knobs of blood sac which fill the lateral pelvic spaces. The condition is seen in a less degree in retroversion and subinvolution. The subjects of varicocoele are usually women who are emaciated and suffer from enteroptosis. The *symptoms* are pelvic tenesmus, backache, and often a throbbing in the ovarian regions. Upon examination there can be felt upon each side of the uterus boggy, elastic, insensitive masses. These are increased in size when the patient stands and disappear when she is examined in the author's position. The operative *treatment* is by laparotomy. The ovarian vein should be ligated at the pelvic brim and again beneath the ovary and tube close to the side of the uterus. Care must be exercised not to include the artery in the ligatures. It is not necessary to remove the ovaries except when they are diseased, as the ligation causes obliteration of the veins.

### ECTOPIC GESTATION

Ectopic or extra-uterine gestation is the fertilization and arrest of the ovum in its passage to the uterus. The ovum may continue to develop and produce a viable child or it may die and be absorbed, or the fetus having died, a lithopædion may form, or the ovum may die but the ectopic placenta continue to grow for a time.

The ectopic sac may form in that part of the tube which lies



within the uterine wall, constituting an *interstitial* pregnancy; or in the free portion of the Fallopian tube, constituting a *tubal* pregnancy; or it may form in the tube and escape between the folds of the broad ligament and form an *intraligamentous* pregnancy; or escape into the abdominal cavity and form an *abdominal* pregnancy. Finally, the ovum may develop wholly within an ovary, an *ovarian* pregnancy; or be partly tubal and partly ovarian, *tubo-ovarian* pregnancy. The most common form is the tubal, and the most rare are the ovarian and intraligamentous. Next in frequency to the tubal are the abdominal forms. If the pregnancy is *interstitial* the ovum may be expelled into the uterine cavity and remain there to full term, while the placenta remains in the tube; or the ovum may die and the case behave as though the pregnancy was strictly tubal. If the pregnancy is *tubal*, the foetus may grow to become viable, or the sac may rupture between the folds of the broad ligament, or the tube abort into the peritoneal cavity. In the vast proportion of ectopic gestations, the foetus dies and becomes a foreign body. It is most likely to live if it escapes into the uterine cavity. A number of cases are reported where the foetus has escaped from the tube into the abdomen and remained viable for the full period of normal pregnancy, or even longer. But one ovarian pregnancy with a viable foetus has been reported, the case being the author's. In the earlier months all trace of the foetus may be lost; later in development it may be converted into a lithopædion, or into adipocere; or the ectopic products of conception may form an abscess and empty into the bowel or the vagina. Not only is tubal pregnancy the most common type, but development of the sac is most usual in the outer half of the tube (Fig. 51).

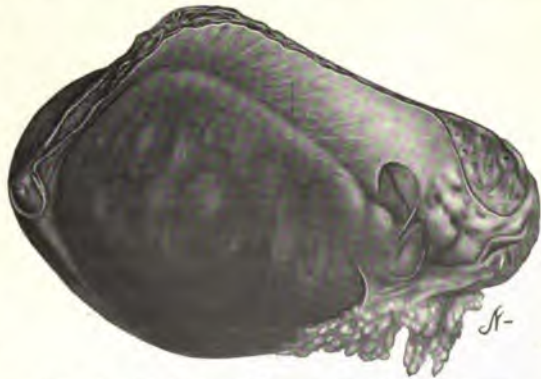


FIG. 51.—UNRUPTURED ECTOPIC (TUBAL) GESTATION.  
The ectopic sac. The ovary.

Wherever implanted the growth of the ectopic placenta has a thinning effect upon the enveloping structure, and there is always a tendency for perforation of the sac by the villi of the chorion. This is due to the fact that the maternal tissues contribute but little to the formation of the placenta: **THE ECTOPIC PLACENTA IS ALMOST WHOLLY OF FŒTAL ORIGIN.** The maternal effort in this direction is limited to the uterine cavity, in which a decidua forms although the fœtus is in the tube. The tubes are but slightly differentiated portions of the uterus, and the association of a tubal fœtus and uterine decidua is not strange. **IT WOULD APPEAR THAT THE FURTHER FROM THE UTERUS THE ECTOPIC CONCEPTION OCCURS, THE LESS LIKELIHOOD OF A UTERINE DECIDUA.**

In the early weeks the tube containing the ovum is much more vascular than its fellow. Gentle pressure will cause the little nodule to glide back and forth in the tube. After a hæmorrhage has taken place into the ectopic placenta or into the tube, the entire tube becomes of a livid hue. In the course of time, repeated intra-tubal hæmorrhages having occurred, the tubal walls will become much thickened by laminated clots.

Upon section the knife will pass through the spongy, blood-stained walls. The sac containing the fœtus may appear exactly as does one of similar size in intra-uterine pregnancy; or all traces of the fœtus may be destroyed, and the mass be nothing more than a thick-walled sac composed externally of peritonæum covering the thinned tubal wall which lies over the layers of fibrin and clots. Within these thick walls may be clotted or fluid blood. The case then presents as a *hæmatosalpinx*. Upon tearing the tissues apart under water, the villi may generally be seen to float up in a characteristic form. There are but two causes of hæmatosalpinx: tubal gestation and tubal papilloma; and as papilloma of the tube is exceedingly rare, we may say that nearly all cases of hæmatosalpinx are due to tubal gestation.

The lesions produced by advanced ectopic gestation, whether tubal or abdominal, are very many. As the placenta grows it reaches out and attaches to the bladder, side of the uterus, intestines, or pelvic wall. In consequence the vascular supply of the involved organs becomes enormously increased and the viscera distorted.

If the pregnancy be *ovarian*, the sac will be composed at first of ovarian tissue only, afterward of ovarian tissue, the attached

part of the Fallopian tube, and the broad ligament. But in ovarian pregnancy at any stage, the placenta will be wholly within the sac, the ovarian ligament will be evident, and the Fallopian tube remain throughout its course as an elongated but distinct and uninvaded structure. Ovarian pregnancy simulates in appearance ovarian cyst or ovarian hæmatocele.

*Ætiology.*—Ectopic gestation may be caused by any factor which will arrest the fecundated ovum in its passage to the uterus. The ovum may fall into a diverticulum in the tube; it may be stopped at a point of stricture which has been produced by an adhesion, flexure, or stenosis of the tube; BUT BY FAR THE GREATER NUMBER OF TUBAL GESTATIONS ARE DUE TO ADHESIONS WHICH BIND THE TUBE IN SUCH A WAY AS TO STOP ITS NORMAL PERISTALTIC ACTION. Salpingitis of a simple catarrhal type renders the tubal mucosa in a condition propitious to the occurrence of ectopic gestation, but the more usual and severe forms of salpingitis rather tend to prevent ectopic gestation. I have found most of my cases giving a history of mild sepsis after abortion or labour. It will be recalled that sepsis extends through the lymphatics and not primarily through the tubes, producing peritonitis rather than salpingitis. The lymph effusion seals the ovary to the tube and prevents tubal peristalsis. A large number of tubal gestations are seen to follow conservative operations upon the tubes and ovaries, it being probable that such operations lead to the formation of adhesions, while at the same time opening the tube to the entrance of ova. Ectopic gestation may be multiple and may be repeated. It may also occur coincidently with uterine pregnancy.

*Symptoms.*—THE NEARER THE LODGMENT OF THE OVUM IS TO THE UTERINE CAVITY, THE MORE CLOSELY WILL THE SYMPTOMS SIMULATE NORMAL PREGNANCY. Amenorrhœa, anorexia, morning nausea are seen. But they may all be absent and the patient appear and feel in perfect health. In my experience, amenorrhœa has been absent more often than present. Upon the onset of ectopic gestation, a true decidua begins to form in the uterus. After a few weeks, usually, this is cast off, producing bleeding; and it is this irregular and abortion-like bleeding which I have found as the most frequent first symptom of ectopic gestation. And the nearer the gestation sac to the uterus the greater the development of the decidua and the more profuse the hæmorrhage accompanying its discharge. But if the foetus does not die and the sac does

not rupture, the formation of a tumour will be noticed, quickening be felt, and all the symptoms of normal pregnancy be experienced. Upon the death of the foetus all these will cease and a tumour remain; or, if the foetus dies in advanced ectopic gestation, a spurious labour may set in. As a rule, some form of rupture of the sac takes place. Either the tube bursts, or the

membranes rupture and the sac contents escape through the fimbriated end of the tube (Fig. 52).



FIG. 52.—RUPTURED ECTOPIO (TUBAL) GESTATION.

*Pain* is produced by even a partial rupture of the sac. This pain is severe, is of sudden onset, is lancinating, and unlike any pain previously felt. It is always accompanied by depression, and, if much blood is lost, collapse or sudden death may occur. The patient while on the toilet, or *in coitus*, or even sitting still, may scream with the sudden pain, and in a short time die.

The sac may rupture and the blood escape in large quantities, producing all the symptoms of great shock; or there may be a continuous slow dribble of blood and the system compensate for this for a long time before shock appears. The effusion of blood into the peritoneal cavity leads to the production of plastic lymph, and the presence of this lymph, as well as the absorption of the dead blood, gives rise to a slight toxæmia, with elevation in temperature. But fever is not a usual symptom of ectopic gestation. The symptoms of pain and irregular bleeding may, after a time, cease, the ectopic sac and its contents wither and be converted into a mole, and the patient's health be restored. But such a fortunate result is unusual. As a rule the ectopic sac, after death of the ovum, either suppurates or continues to grow until it bursts.

Unless relieved by surgical means all ectopic fetuses die and about 70 per cent of the mothers, a mortality to both foetus and mother not found in any other form of gestation under any other circumstances.

The symptoms of *tubal abortion* are those accompanying the presence of the ectopic sac *plus* those due to a continuous loss of blood. These latter are a progressive anæmia and failure in strength, together with sharp stabbing pains in the affected tube.



This pain is not due to tearing of tissue, but is caused by spasmodic contraction in the hypertrophied and infiltrated tissue of the tube.

*Examination.*—The signs will vary with the seat of the sac and whether or not rupture has occurred. In tubal pregnancy before rupture there will be found a dense but elastic mass attached to one cornu of the uterus. It is usually not greater than of 3 inches diameter, is movable, is sessile upon the uterus, and is sensitive. If the examination be made at short intervals, the somewhat rapid growth may easily be appreciated.

If the pregnancy is interstitial, the signs will be those of a fibroid situated at the uterine cornu, but rapidly growing.

If the pregnancy is abdominal or ovarian, the signs will be those of an ovarian tumour.

After rupture has taken place, the signs due to the presence of the fœtus will be masked by those due to escape of blood. (a) If the blood has escaped suddenly into the abdominal cavity it will collect into a pool in the *cul-de-sac*. Its presence cannot at first be detected, because it remains fluid for some days; but after it clots, the posterior vaginal fornix will bulge out and the protuberance will be boggy, elastic, and insensitive. After a week or so the blood will become encysted within the pelvis by the effusion of lymph, and now for the first time the uterus will become fixed, partly by the formation of fibrin within the clot and partly by plastic lymph. The escape of blood into the abdominal cavity constitutes an *intraperitoneal hæmatocele*, and the condition very rarely arises from any lesion other than an ectopic gestation. A particularly vascular Graafian follicle will sometimes produce an ounce or two of blood which, upon operation, may be discovered, or blood may escape from a papillomatous ovarian growth, but beyond this I have met no condition except trauma which produces pelvic hæmatocele. The blood clots very slowly and the clots are usually small. The slow clotting is due to the absence of air, and the fractional clotting is due to invasion by great numbers of leucocytes.

(b) If the blood escapes between the folds of the broad ligament it soon clots. Before clotting the signs will be those of an intraligamentous cyst: to one side of the uterus will be an elastic fluid accumulation which fills one side of the pelvis, displaces the uterus away from that side, lifts it up, and which is *sessile* upon

the uterus. The uterus is slightly movable. After the blood has clotted the position of the uterus will be the same, but the mass sessile upon the uterus will be hard and inelastic, exactly simulating an intraligamentous fibroid.

*Diagnosis.*—This is not easy before symptoms of hæmorrhage arise. It is not the pain, the mass, the sensitiveness, nor the intra-uterine hæmorrhage which alone points to the lesion. It is the careful consideration of the history of the case, accurate weighing of the value of each symptom, as well as their association, which makes the diagnosis possible. Tubal pregnancy and tubal abortion will simulate hydrosalpinx and cystic ovary.

An ectopic sac ruptured between the folds of the broad ligament will simulate broad-ligament cyst and broad-ligament fibroid. Old pelvic hæmatocele, producing as it does fixity of the uterus, abundance of exudate, pelvic density and a low form of fever, may be mistaken for diffuse pelvic suppuration. Whenever there is any suspicion of ectopic gestation the posterior *cul-de-sac* should be opened and the diagnosis made clear. Vaginal section as a diagnostic procedure is perfectly safe and argument for delay is no longer to be heeded. If posterior vaginal section has done no more, at least it has robbed ectopic gestation of many of its terrors. It is no longer necessary to wait for the pallor, the rapid pulse, the thirst, and other symptoms of hæmorrhage before viewing the pelvic contents. The moment a mass is felt to one side of the uterus, and if there be the faintest suspicion of ectopic gestation, it is the surgeon's duty to at once clear up the diagnosis by an exploratory vaginal incision. The basis of this strong statement is that the earlier these cases are treated the greater the opportunity for practising conservatism, and likewise the less the risk. Upon opening the posterior *cul-de-sac* a careful digital examination is made of the pelvic contents. If there has been a recent hæmorrhage dark fluid blood will escape. If there has been a hæmorrhage some days past, small glistening clots will escape. An unruptured tube will be found of livid colour. It is exceedingly friable, and tears readily with rough handling. For the technique of this operation the reader is referred to the article on Exploratory Vaginal Section.

*Treatment.*—There are two forms of ectopic gestation in which the treatment may be expectant: if the pregnancy be interstitial, there being sufficient tissue to prevent rupture and there being a

possibility of the sac evolving towards the uterine cavity, a waiting policy is admissible; and in abdominal pregnancy if the foetus is known to be viable, operation may be postponed until a living child can be extracted. Both of these states are exceedingly rare, and therefore under only these most exceptional circumstances is delay warranted. THE RULE IS, AS SOON AS ECTOPIC GESTATION IS DISCOVERED, OPERATE. There are two methods of operating: the vaginal and the abdominal. The vaginal incision should be made in all cases of pelvic hæmatocele, all cases of pelvic suppuration due to ectopic, and all cases of ectopic ruptured into the broad ligament. The author also prefers it in all cases except those in which the foetus is too large to pass the vaginal outlet.

Abdominal section is undoubtedly indicated where there is a viable foetus, or a lithopædion, or adipocere, or a large dead foetus. Inasmuch as not every one is familiar with the technique of vaginal section, or has the equipment for performing it, both operations will be described later.

## CHAPTER VII

### *UTERINE FIBROMATA AND FIBRO-MYOMATA*

THESE are commonly classed as "uterine fibroids." Of all uterine tumours they are the most common. They occur very rarely before the twentieth year of age and are seen most frequently between the ages of thirty-five and forty-five. They are more frequent in the negress than in the white woman. The origin of these tumours is not definitely determined. As a rule, they result from the growth of certain cells which have been caught within the uterine walls during the development of the uterus. They are therefore congenital in origin. These cellular "rests" may remain quiescent for years, and then, under the stimulation of pregnancy or endometritis or from unknown causes, may begin to develop. Being of structure identical with that of the uterine muscularis, in their growth they produce masses of tissue identical with that of the uterus. If this tissue remains pure in type, it forms a myomatous growth; if admixed with fibrous tissue, a fibro-myoma results; and if the muscular cells entirely disappear and connective tissue alone remains, the tumour is a fibroma. These growths are exceedingly capricious in their development. A nodule may be present and remain quiescent for years, then grow rapidly; or a tumour which has caused most disagreeable symptoms may apparently disappear. Under the influence of menstruation and pregnancy, they tend to increase in size. After delivery they may involute with the uterus. The advent of the menopause tends for a brief period to hold them in check, but in the intramural type only.

Fibromata of the uterus may undergo certain degenerative changes. They may become necrotic and slough, become calcareous, undergo fatty degeneration, or become sarcomatous and even carcinomatous. The percentage of fibromata which become malignant or which are accompanied by carcinoma of other por-



tions of the uterus is not inconsiderable. The vessels in the tumour, particularly the veins, may become greatly and generally enlarged, constituting the rare telangeiectatic fibroid. Or the lymph spaces between the muscular bundles may become much distended and the entire tumour be converted into a spongy mass—fibrocystic tumour. As a rule, fibroids are hard, and when cut project from a distinct capsule. The fibroid may be situated in either the body of the uterus or in the cervix, uncommonly in the cervix. It may be within the uterine walls, and, if bulging into the cavity of the uterus, it is intramural and submucous, or if projecting somewhat towards



FIG. 53.—SCHEME OF UTERINE FIBROMYOMATA.

*A*, pedunculate subserous tumour; *B*, sessile subserous tumours; *C*, pedunculate submucous tumour; *D*, intramural tumour.

the peritoneal cavity, intramural and subserous. It may lie beneath the peritonæum and be attached to the uterus by a distinct pedicle, pedunculate, or by a broad base, and be sessile. It may be intra-uterine, and either sessile or pedunculate. If projecting between the folds of the broad ligament, it is intraligamentous, or if beneath the peritonæum of the pelvic floor, it is retro-peritoneal. These clinical designations are not without value as indicating the regional importance of the growth. Under the impulse of the contraction of the uterine muscle, all intramural fibroids have a tendency to evolve towards either the uterine or peritoneal cavity. The fibroids may form attachments to adjacent organs, as the omentum, and become entirely separated from the uterus, being nourished by the vessels in the false adhesions. In their development fibroids may press upon a ureter and produce hydro-ureter, or obstruct the passage of urine from the bladder or fæces from the bowel. They may press upon the sciatic or obturator nerve, causing much neuralgic pain. When adherent to the intestine, a fibroid may become infected by migration of germs from the intestinal canal.



FIG. 54.—FIBRO-MYOMA UTERI.

There are a number of small nodules seen. The uterus has been cut open and the capsule of the large interstitial tumour split to show the type of encapsulation. Abdominal ablation

Fibro-myomatous tumours are rarely single, the presence of one indicating the nidus of others, though these latter may be exceedingly small, even microscopic. Upon section, the fibroid is seen to contain connective tissue and muscular bundles, occasionally bits of utricular gland. It is in these latter that carcinoma may develop. As the fibroid develops it becomes surrounded by a distinct fibrous capsule from which the growth is nourished; but sometimes the uterus is generally enlarged, all its walls being thickened by multiplication of its fibrous and muscular elements,

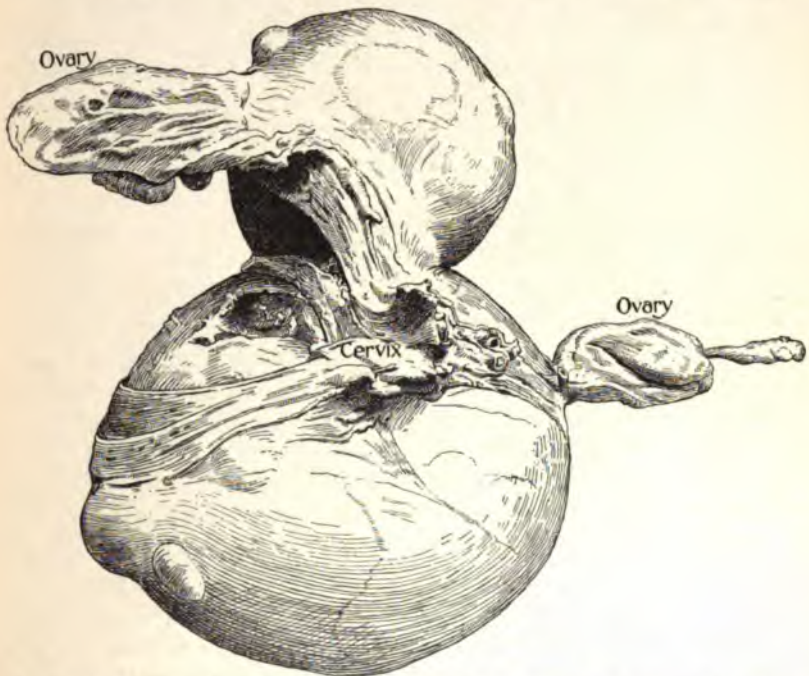


FIG. 55.—THE SAME SPECIMEN AS ILLUSTRATED IN FIG. 54, SEEN FROM BELOW IN ORDER TO SHOW THE ENORMOUS HYPERTROPHY OF THE OVARIES.

constituting general uterine fibrosis. The nearer the fibroid is to the endometrium the greater the tendency to a thickening in the latter—hypertrophic endometritis.

There is a marked tendency for fibromata to occur in families, and a further tendency for fibroids of the uterus to be associated with fibroids of the breast. The softer and more vascular a fibroid is the greater its tendency to grow. Very firm and par-

ticularly pure fibromata grow very slowly and often remain quiescent after the menopause.

The ovaries are always diseased to some extent in myoma. The most usual lesion is a hyperplastic change. Under pressure these enlarged ovaries take most fantastic forms. Any form of ovarian disease may occur with myomata. The cause of the hyperplasia of the ovaries in myomata is not known, but the condition is well recognized.

*Symptoms.*—As a rule, the patient notices a progressive increase in the amount of blood lost at the menses. There is also very generally more menstrual pain than is habitual. The *menorrhagia* is due to the hypertrophy in the endometrium, which very commonly occurs in the presence of a myoma, and the *dysmenorrhœa* is caused by spasmodic contractions in the uterine muscle in its attempts to squeeze out the myoma, which is practically a foreign body within the uterine walls. Sometimes the menses will have been normal and the patient will have a sudden severe hæmorrhage, either at a menstrual period or between the menses. When the menses have become progressively increased there will, after a time, be irregular bleedings. The bleeding is most pronounced with the submucous and intramural fibroids, and less marked with fibroids which are subperitoneal and with those which spring from the cervix. After the hæmorrhages have reduced the patient to a pallid myxœdematous state there may be for months an amenorrhœa, or at most a watery, blood-tinged discharge. The patient has little more blood to lose, and anæmia has so lowered the metabolic forces that the menstrual nixus is absent. The loss of blood is in no way dependent upon the size of the tumour. At first the blood lost is bright, and clots, but after a time is so lacking in fibrin as to remain pale and fluid. As a rule, there is no increase in the habitual leucorrhœa, but occasionally there is an excessive intermenstrual watery flow, especially in fibrocystic cases. If there be a fibroid projecting into the uterine cavity it may superficially slough and give rise to a putrid discharge.

Next to menorrhagia, *pain* is the most frequent first symptom of myoma. This may be spasmodic, expulsive, and occurring at or about the menses, occasionally between, and is like a labour pain. Or the pain may be due to pressure by a myomatous nodule upon a nerve. If the tumour is intraligamentous, it may press



upon the obturator nerve and cause pain and disability in the hip. Or the pressure may be anterior upon the crural nerve, or posterior upon the sciatic. The pain is not continuous, and is entirely irregular in occurrence. Some patients complain also of a "bearing-down" pain, or dragging pains in the loins.

The presence of an *abdominal tumour* is next in frequency as a first symptom. Naturally this is most often the case where the tumour is intramural or subperitoneal, and springing from the corpus uteri.

*Pressure symptoms* are frequent. Tumours arising in the anterior wall, particularly if near the internal os, may produce dysuria, ardor urinæ, or retention of urine. Those which are retro-uterine press upon the bowel and produce difficult defecation, obstruction of the rectum, and hæmorrhoids. In fact, the appearance of hæmorrhoids in a nullipara with a history of menorrhæ-

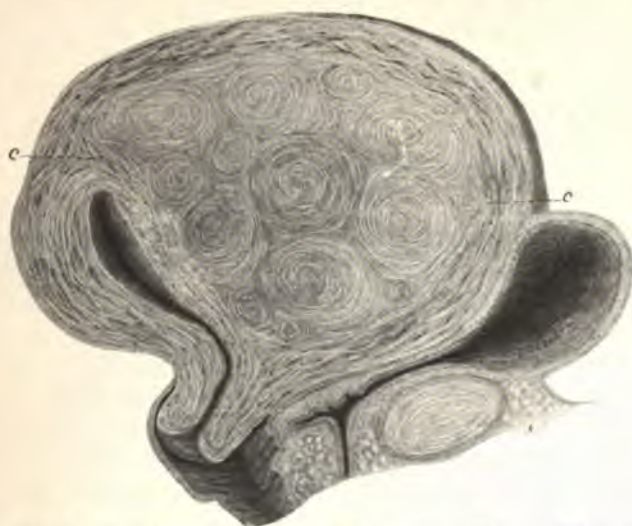


FIG. 56.—A FIBRO-MYOMA SPRINGING FROM THE ANTERIOR UTERINE WALL, BENDING THE UTERUS BACKWARD AND LIFTING THE BLADDER INTO THE ABDOMEN.

gia has often led me to an examination which discovered a myoma. The lumen of the rectum may be so narrowed that the stools are rat-tail in form.

Pressure upon the pelvic veins often produces varicose veins in the legs or in the vulva.

Many patients complain of a severe vertex headache just previous to a hæmorrhage, while in the stage of anæmia headache is severe and frequent. Œdema of the limbs from obstructed

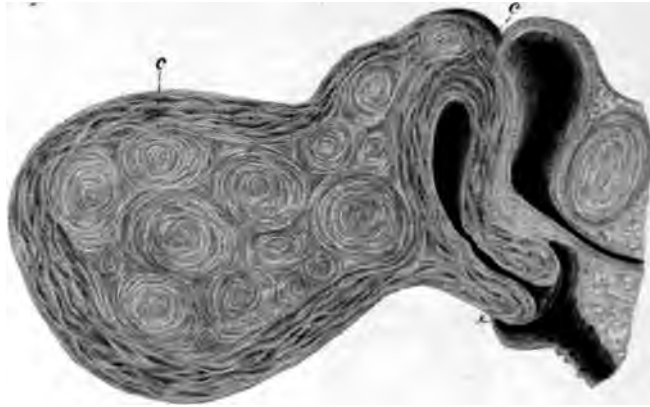


FIG. 57.—A FIBRO-MYOMA ARISING FROM THE POSTERIOR WALL OF THE UTERUS, BECOMING IMPACTED IN THE PELVIS BENEATH THE PROMONTORY OF THE SACRUM AND FORCING THE CERVIX UP AGAINST THE PUBIC BONE, CAUSING COMPRESSION OF THE URETHRA AND OBSTRUCTING THE RECTUM.

venous circulation is frequent, and in the anæmic stage is to be expected. Obstruction by pressure of a ureter is often found causing hydro-ureter, hydronephrosis, or pyonephrosis.

The *heart muscle* undergoes interesting changes. These are of two kinds: the fatty degeneration and the brown degeneration. The greater the loss of blood the more likely is one or the other form to occur, especially with fibrocystic tumours.

Fibro-myoma uteri is very often associated with complications. Pedunculate tumours are prone to contract adhesions, particularly to the omentum and colon. Very large tumours may become adherent to the spleen, stomach, or liver. Certain lesions of the ovary are often found with myofibroma, particularly hæmatoma and interstitial hypertrophy. The Fallopian tubes show in many cases the changes due to infection: hydrosalpinx and pyosalpinx. A pedunculate fibroid may rotate on its pedicle sufficiently to cause strangulation, peritonitis, and sepsis. And this accident is always to be feared when pregnancy occurs in the presence of a pedunculate fibroid.

A fibroid may become infected from an adherent knuckle of

gut, break down into pus, and this pus discharge into the intestinal canal, and fæces into the shell of the fibroid.

As an intraligamentous fibroid develops it displaces the ureter, and this may lie beneath or across the capsule of the fibroid.

Until hæmorrhages occur most patients look well. Later a sickly pallor comes on, due partly to the loss of blood, partly to the effect of the tumour upon the digestion.

*Upon examination* a great variety of signs may be elicited depending upon the size, location, and type of tumour. A fibroid springing from the posterior surface of the uterus will, as it grows, displace the uterus forward until, eventually, it will press the bladder against the symphysis or even tilt the uterus and bladder out of the pelvis. When such a nodule is small it can be felt posterior to the cervix as a hard body fixed to and sessile upon the uterus.

If the fibroid is intraligamentous, it will immovably fix the uterus. The uterus will be displaced laterally away from the



FIG. 58.—MULTIPLE FIBROCYSTIC TUMOURS OF THE UTERUS.  
There are both cystic and solid portions. Abdominal ablation.

fibroid. Such a nodule is hard, not sensitive, not fluctuating, and is sessile upon the uterus. If the fibroid is subperitoneal and pedunculate, it may move independently of the uterus; but its

association with the uterus is readily determined by shoving the fibroid upward, when the uterus will also move away from the finger in the vagina.

Tumours which are intramural form a mass indistinguishable from the uterus. They are not fixed until the pelvis is filled, and are insensitive, points of value in differentiating them from inflammatory lesions. Sometimes there will not be one predominating tumour, but the uterus will be studded with knobs in most of its periphery.

Fluctuation cannot be elicited in fibromata or fibro-myomata, but is occasional in fibrocystic growths and in the rare telangiectatic tumours.

The percussion note over fibroids is flat.

Sometimes a vascular bruit is heard upon auscultation.

Large tumours resting on the aorta may transmit the aortic sounds.

Upon vaginal examination the cervix may be found gaping and admit the finger, presumptive of the presence of a myoma projecting into the uterine cavity.

The cervix may be displaced towards the pubes if the fibroid be retro-uterine. If springing from the anterior wall, it may displace the cervix downward and backward.

Intraligamentous nodules push the cervix to the opposite side of the pelvis.

Large fibroids above the uterus may push the organ entirely out of the vagina, and a myoma may escape from the cervix and by its weight invert the uterus.

Rectal examination furnishes most valuable information regarding the contour of the posterior wall of the uterus and the amount of pressure upon the rectum.

Instrumentation is of little value in detecting a myoma. The speculum will show the ~~state~~ of the os externum, but often the cervix is so displaced that it cannot be seen. When it can be reached a probe passed into the cavity of the uterus will show the direction of its canal, but the uterine cavity may be so distorted that a probe cannot be passed.

*Differential Diagnosis.*—If peritonitis has taken place about a fibroid, or if a pus focus has formed, the precise differentiation of the lesions may be impossible. A myomatous uterus may be interpreted to be a pregnant uterus, diffuse pelvic suppuration,



ruptured ectopic gestation, broad-ligament cyst, ovarian cyst, broad-ligament abscess, or pelvic exostosis. A myoma *may* exist with any of these conditions.

*From Pregnancy.*—The pregnant uterus is soft, the fibroid hard. The cervix of the pregnant uterus is soft and tends to be open, that of the myomatous is firm. Amenorrhœa accompanies pregnancy, is exceptional in myoma. The pregnant uterus is symmetrically enlarged, while the myomatous is most often irregularly so. In pregnancy the vulva is cyanosed after the third month; in myoma, it may be varicosed, but is never cyanosed.

*From Pelvic Suppuration.*—Diffuse suppuration gives a uterus fixed in a dense mass and fixed in the pelvis, so may myoma. Suppuration generally causes fever, sometimes not; myoma does not. Both cause menorrhagia. Fluctuation is present in pus, absent in myoma. Emaciation is common in suppuration, but does not result from myoma. Chills are absent in myoma, frequent in suppuration. In suppuration are many characteristic symptoms and an early history entirely wanting in myoma. Pyogenic cocci are usual in cervix or vagina in suppuration, and occasional in myoma. Purulent leucorrhœa is usual in one, not in the other. Leucocytosis is present in suppuration, absent in myoma. Peptones occur in the urine in suppuration, not so in fibroma.

*From Ovarian Cyst.*—Both may displace the uterus. Ovarian cyst does not cause menorrhagia, often produces amenorrhœa. An ovarian cyst is elastic and gives deep fluctuation; myoma may be elastic, but does not fluctuate. Ovarian cyst is movable, and *independently so of the uterus*, while the uterus moves with a myoma. A pedunculate fibroid may simulate a floating kidney, but the area of displacement of the fibroid is downward, that of the kidney upward.

*From Ectopic Gestation.*—Both produce hæmorrhages and a mass about the enlarged uterus. The confusion is chiefly with tumours which are intraligamentous. The fibroid is more dense than the clot and lymph resulting from ruptured ectopic. Tubal gestation is very sensitive, myoma is not. Fibroid produces pain, which comes on very gradually; the pain of ruptured ectopic is sharp, lancinating, and accompanied by severe shock. The hæmorrhage from the uterus in ectopic has not been preceded by others; on the contrary, there is often antecedent amenorrhœa, while in myoma the menorrhagia is usually progressive.

*Exostosis* and *enchondromata* have no such histories as are furnished by *fibromata*.

*From Inversion of the Uterus.*—In inversion the two orifices of the Fallopian tubes may be seen near the base of the mass,

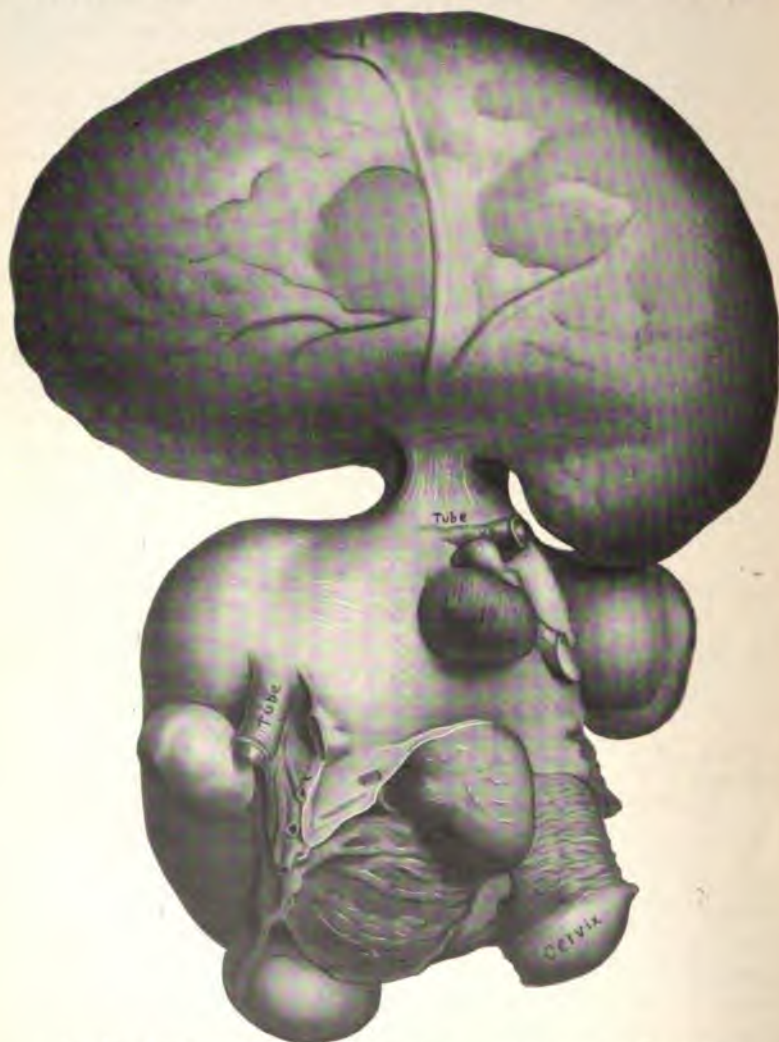


FIG. 59.—ALL TYPES OF FIBRO-MYOMA ARE ILLUSTRATED IN THIS SPECIMEN.

The large pedunculate nodule had been diagnosticated as a floating kidney. The distortion of the uterus is well shown. To the left of the cervix intraligamentous nodules are seen. Abdominal ablation.



and above at the constricted neck of the tumour no entrance to a uterine cavity can be found. A fibroid protruding into the vagina shows no Fallopian orifices on its surface, and above at the pedicle there is always to be found an entrance into the uterus.

*Prognosis.* — A myoma may slough and cause death from septicæmia, or a pus focus may form in an ovary or tube and rupture. Rarely does a patient with myoma bleed to death. The growth kills indirectly rather than directly, by so weakening the patient that some intercurrent disease supervenes and destroys the patient. Diseases of the lungs, valvular lesions, degenerative changes in liver, spleen, and kidneys, are exceedingly common with myomata of long standing. In considering the propriety of any line of treatment, the complications which may result if delay is permitted must be given due weight. Myoma has a marked influence upon fertility and pregnancy.

Twenty-five per cent of myomatous women are sterile, and about 30 per cent miscarry. Myomata may entirely disappear, so far as we can discover from examination; but such a fortunate result is exceedingly rare, and is not to be considered in determining a method of treatment. But more frequently myomata are extruded into the uterine cavity and expelled from the uterus. A MYOMA TENDS TO POSTPONE THE MENOPAUSE AND TO CAUSE A RECURRENCE OF THE BLEEDINGS EVEN AFTER THE CHANGE HAS ONCE OCCURRED. THE OCCURRENCE OF THE MENOPAUSE HAS LITTLE INFLUENCE ON THE GROWTH OF MYOMATA, AND AFTER THE CLIMACTERIC DEGENERATIVE CHANGES IN THE MYOMA AND COMPLICATIONS ARE MOST NUMEROUS. The consideration, then,



FIG. 60.—A LARGE FIBRO-MYOMA OF THE CERVIX (Roberts).

The probe is passed into the cervical canal.

of an approaching climacteric furnishes no comfort to either physician or patient. Very few myomata become sarcomatous, but cancer in uteri, the seat of myomatous change, occurs with significant frequency.

Not the least important result of myomata, which cause frequent and profuse hæmorrhages, is a diminution in the coagulability of the blood; the time of clotting may be as much as fifteen minutes.

*Treatment.—Medical.*—If a myoma is submucous, the administration of ergot in large doses sufficient to produce uterine contractions tends to cause the tumour to become pedunculate and intra-uterine, when it may be removed through the cervix. Certain myomata are markedly influenced by the internal administration of thyroid extract and mammary-gland extract, and this influence is most marked in tumours having little fibrous tissue in their composition. Pedunculate subperitoneal tumours and those which spring from the region of the cervix, as well as fibrocystic growths, are little influenced by these animal extracts. In certain cases the results of this treatment are startling. When the administration of the drug is stopped, the tumours begin to grow again. This treatment is most efficacious if preceded by curettage. Certain patients cannot take thyroid because of its effect upon the heart. Thyroid is more effective than mammary gland in causing reduction in a myoma. The drugs operate by causing absorption of the constituent parts of the growth. They further tend to check the hæmorrhages accompanying the intramural myomata. Under this treatment a uterus which has repeatedly aborted may permit a full-term gestation. I have held tumours in abeyance for years with this treatment. The dried extracts are given in 5-grain doses *t. i. d.*

If a patient is seen during a hæmorrhage and the bleeding is alarming, the cervix should be plugged with iodoform gauze and the vagina tamponed, or the uterus filled with gauze, or the cervix sewed up. The latter procedure requires no narcosis, and if done the sutures must be removed in three days lest the blood pent up in the uterus decompose. *Electricity* once advocated for fibroids is of little efficacy, and not without danger.

Pedunculate subperitoneal myomata, pedunculate intra-uterine growths, retroperitoneal and intraligamentous growths are to be treated surgically only.



## UTERINE FIBROMATA AND FIBRO-MYOMATA 169

The myomatous uterus may be subjected to removal of the tumours only, myomectomy; or the uterus itself may be amputated at the cervix by laparotomy, partial hysterectomy; or the entire organ may be removed, ablation or total hysterectomy. Furthermore, in certain cases these operations may be performed through the vagina, in certain others through the abdomen.

*Ligation of the uterine arteries* by the vagina is of doubtful efficacy in causing arrest in growth of a myoma, as the collateral circulation with the ovarian arteries is too elaborate.

*Curettage* has a marked influence upon the growth of intramural myomata, particularly if performed after delivery or miscarriage. The general treatment of a myomatous case seeks the diminution in the loss of blood by confinement to bed during the menses and the administration of thyroid or mammary extract, a generous diet with abundance of fluids, and iron preparations to overcome the anæmia.

BY NO MEANS DOES THE DISCOVERY OF A MYOMA INDICATE A SURGICAL OPERATION. THE LOCATION OF THE GROWTH AND THE SYMPTOMS IT PRODUCES, AS WELL AS ITS SIZE, NOT ONLY WILL DETERMINE THE URGENCY OF SURGICAL INTERFERENCE, BUT WILL ALSO FAIRLY WELL DEFINE THE NATURE OF THE OPERATION.

## CHAPTER VIII

### CANCER

CANCER occurs in the uterus more frequently than in any other part of the human body. It is undoubtedly increasing, and so rapidly in certain localities as to furnish to these the designation of "cancer zones." It is rare before the twenty-first year, and no case is reported of its occurrence before puberty. It is most common between forty and fifty. Advanced age is not exempt. It occurs in the cervix in about 90 per cent of all cases and in the body of the uterus in about 10 per cent. There are two types, the epithelial and glandular.

The *cause* of cancer is unknown. There are two chief theories: Cohnheim's, which supposes cancer to be due to activity in epithelial "rests" of embryonic origin, and the parasitic hypothesis. The author inclines to Cohnheim's theory, though impressed by the arguments of those who seek to prove its parasitic origin.

*Age*.—Epithelioma is most frequent between the ages of forty and forty-five, while adeno-carcinoma is most frequently seen before forty years of age. Epithelioma is rare while the woman is bearing children, and usually begins after she has ceased; but adeno-carcinoma is not unusual during the childbearing period.

*Race*.—It is less common in the negress than in the mulatto, and less in both than in the white race. The yellow races also have it.

*Heredity*.—Whether the disease is inherited, or because members of a family live under the same environment, or because it is contagious, certain it is that in about 20 per cent of uterine cancers other members of the families have had some form of cancer.

The influence of *irritation* upon the genesis of cancer is not settled. We find that cancer of the cervix is rare in the nulliparous, while the cervix through which children have passed is

prone to cancer. The same is true in other parts of the body: the soot-irritated scrotum of the chimney-sweep, the tongue and lip of the pipe-smoker, the breast once inflamed and lanced, etc., all show the influence of injury upon the proneness to cancer.

### CANCER OF THE CERVIX

**Epithelioma.—Squamous Cell.**—This is the most frequent form. At first the cervix is nodular, with here and there little elevated papillæ. The nodules are tense, feel hard but are easily torn, and bleed easily upon rough handling (Fig. 61). The papillæ rapidly multiply and increase in length, crowd together, and project into the vagina as a fungating mass (Fig. 62). If we cut the cervix where this mass is attached, we find it pale in areas with darker striations. The latter are the fibrous bundles of the cervix, and the lighter tissue is composed of nests of epithelium which may often be squeezed out as pearl-like bodies. Not only is there epithelial proliferation, forming a growth outward, but also an epithelial invasion of the essential structure of the cervix. *The ingrowth precedes the outgrowth.* The superficial portions of the growth soon disintegrate, forming necrosed spots covered by blood and pus. This disintegration proceeds until the entire cauliflower-like mass melts away, leaving in place of the cervix, the contour of which may be partially or wholly lost, an excavating ulcer. The disease may involve the vagina adjacent to the cervix, or extend outward into the broad ligaments through the lymphatics, or involve the bladder and less frequently the rectum. As ulceration progresses, the corrosion may open into the bladder or rectum. As the broad ligament becomes infiltrated, the ureter is pressed upon, resulting in hydro-ureter, with possibly pyonephrosis. Peritonitis and tubo-ovarian inflammation are frequent lesions in advanced carcinoma. The squamous epithelium covers the vaginal face of the cervix and extends into the cervical canal but a short distance; hence this form of cancer is usually seen on the free surface of the cervix.

Histologically the tissue is found to be composed of a proliferating connective tissue surrounded by many layers of squamous epithelium. The papillæ of the outgrowths are pierced by delicate vessels which break easily. The connective tissue is sparse, while the epithelium is everywhere.

**Adeno-carcinoma.**—This may begin as a nodule which rapidly breaks down, forming a sloughing diverticulum of the cervical canal. The disease may begin at any point of the cervical canal.



FIG. 61.—SQUAMOUS-CELL CARCINOMA OF THE CERVIX. (Natural size.) (Cullen.)

Viewed from below. The cauliflower-like mass has been curetted away, but springing from the enlarged and thickened cervix are delicate finger-like outgrowths, which in a few places have coalesced, forming smooth masses. The advancing margin of the growth is irregular, and appears to be sharply defined. At *a*, over an area  $1 \times 1.5$  centimetres, is a slight elevation covered by very delicate knobs or finger-like projections. This specimen shows very well how the carcinoma may appear in the earliest stage. The cervical canal has been invaded for a short distance.

The nearer it is seated to the external os the greater the involvement of the visible portion of the cervix. The disease also assumes the form of cauliflower excrescences within the cervical canal. The entire cervix may be excavated before the external os is implicated. One or both lips of the cervix may be involved. The epithelium of the old glands is multiplied, the stroma of the glands broken, and the periglandular tissue invaded by glandular epithelium. At the same time there is an enormous multiplication of glandular tissue with the characteristic proliferation of glandular epithelium (Fig. 63).

As a rule, the glandular hypertrophy, proliferation, and ne-



erosis remain for a long time hidden within the cervical canal, but occasionally the disease will produce a cauliflower growth which will protrude into the vagina and appear as though springing from the vaginal face of the cervix.

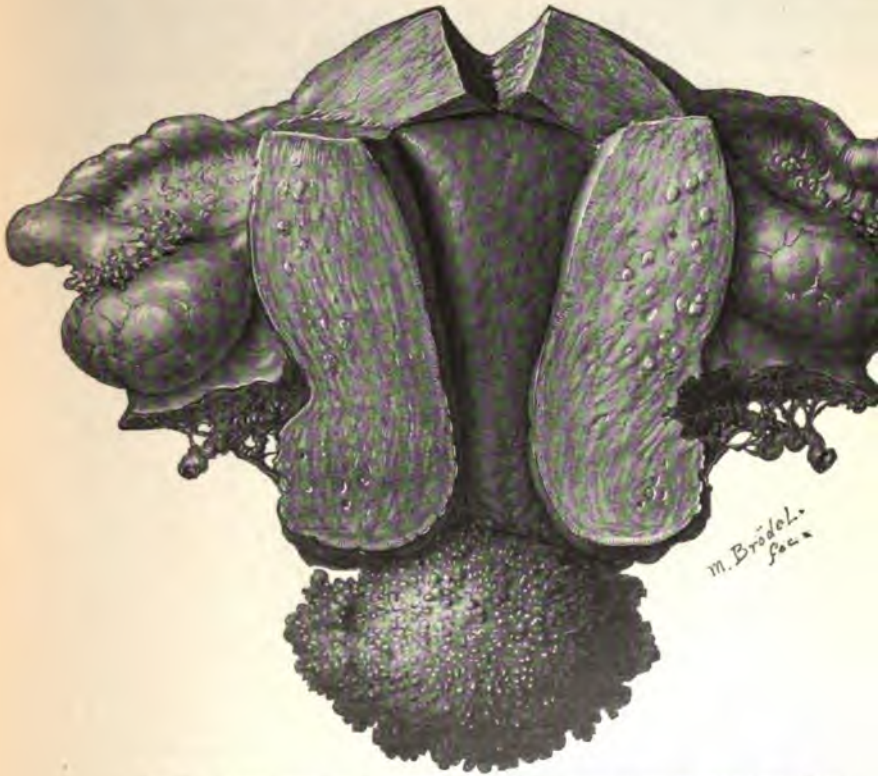


FIG. 62.—SQUAMOUS-CELL CARCINOMA OF THE CERVIX; CAULIFLOWER-LIKE MASS SPRINGING FROM THE ANTERIOR LIP. ( $\frac{1}{3}$  natural size.) (Cullen.)

As can be seen from the relative positions of the tubes and ovaries, the uterus has been opened posteriorly. Arising from the anterior lip is a large cauliflower mass. Its basal attachment is sharply defined, and the growth consists of myriads of delicate projections having rounded knob-like structures. There has been only slight breaking down of the cervix. The uterus is normal in size, and its mucosa is of the usual appearance. Both the tubes and ovaries are normal. The uterine arteries have been dissected out, tied off near their points of origin, and removed with the uterus.

The growth of tissue may block the cervical canal and jam back the blood and secretion within the uterine cavity. This

becoming infected constitutes a "pyometra." Involvement of the bladder is more frequent with adeno-carcinoma of the cervix than with epithelioma, and of the rectum less frequent. The disease tends to extend downward and laterally into the broad ligaments.



FIG. 63.—ADENO-CARCINOMA OF THE CERVIX. (Natural size.) (Cullen.)

The uterus is opened anteriorly. The cervix is considerably enlarged, but its contour is well preserved. To the right, in the picture, there is slight loss of substance in the tissue at the external os. At this point short finger-like processes are seen springing from the surface. Occupying the anterior wall just within the external os, continuous with the finger-like processes, and extending laterally to within a short distance of the broad-ligament attachment, is a new growth contrasting sharply with the normal tissue. The advancing margin of the growth, both along the cervical mucosa and in the substance of the cervix, is irregular. On the left side a section of the cervix has been removed, and the mode of extension is well shown, the processes of the growth penetrating into the healthy tissues, as the roots of a tree into the soil. The body of the uterus is slightly enlarged, its walls are of the usual thickness, but there is an increase of the blood-vessels throughout the muscle, great numbers being seen on cross-section projecting slightly from the surface. The arborescent appearance in the upper part of the cervix is well preserved. The endometrium is normal. Vaginal examination would have failed to give any adequate idea of the extent of the growth.



Pelvic inflammatory lesions are more common here than with the epithelial type of cancer, owing to the frequency of pyometra.

Cancer of the cervix has a marked tendency to remain localized within the pelvis. It extends into the parametrium through the lymphatics, first reaching the glands opposite the obturator foramen, then the higher *glandulæ hypogastricæ* about the bifurcation of the common iliac artery. In advanced cases the inguinal glands also become involved. As the disease extends the rectum becomes surrounded by cancer nodules, the uterus fixed in the pelvis by cancerous infiltration of the broad ligaments, the bladder invaded, the ureters compressed, and the obturator and sciatic nerves pressed upon. The condition then becomes one of general pelvic carcinosis.

*Symptoms.*—As a rule, the first symptom noticed, but one unfortunately which attracts little or no attention, is *an increase in that leucorrhœa which the woman habitually has*. This increase is slight in epithelioma, but in adeno-carcinoma of the cervical canal it is marked. This observation applies to the disease if occurring before the menopause. After the menopause the patient will observe a return of that long-forgotten leucorrhœa which she once had. This symptom, I find, occurs about four months before any other. It is important and is due to epithelial activity, upon which the secretion depends.

In epithelioma, the next symptom is *bleeding*, or the escape of blood-stained discharge at irregular intervals. This is due to abrasion of the exceedingly friable epithelial proliferations, and may be produced by the slightest touch of the finger, by coitus, by douching, or by any force which will cause the cervix to rub against the vagina. The menses are not increased.

The second symptom in adeno-carcinoma of the cervical canal is a *foul, putrid discharge* which is due to necrosis of the tissues. The canal being protected against injury, bleeding does not so soon occur, but the passage of a sound will readily develop it. This discharge also soon becomes blood-stained.

THE OCCURRENCE OF A BLOODY DISCHARGE OR OF A PUTRID DISCHARGE BETWEEN NORMAL MENSES IS STRONG PRESUMPTIVE EVIDENCE OF CANCER, AND AT LEAST ALWAYS DENOTES MOLECULAR DEATH OF TISSUE. These symptoms demand the most careful examinations. After cauliflower growths have formed there will

be frequent, almost continuous, bloody discharges of foul odour, purulent or sanious.

*Pain* is not a symptom of cancer of the cervix until pelvic involvement occurs with pressure on the nerves. Bloody urine and symptoms of cystitis occur as soon as the papillæ penetrate the bladder mucosa. Anæmia and cachexia do not occur until the stage of ulceration is well advanced.

The menstrual habit of the patient is not influenced.

Nearly all cases of cancer of the cervix have had children. Fertility in women who have cancer of the cervix has long been noted. The disease is uncommon in the nulliparous.

*General Health.*—Most patients with cancer of the cervix are in very good flesh. The appetite remains good and colour normal until ulceration has progressed quite far. Then a form of secondary anæmia occurs which is described as “cancerous cachexia.” As the pelvis becomes involved, the venous circulation is interfered with and œdema of the legs may occur, symptoms of cystitis supervene, obstruction to the flow of urine through the ureters with kidney lesions, and pressure upon the rectum with constipation or hæmorrhage if the cancer invades the lumen of the gut, are symptoms. The patient is utterly wretched in advanced cases. The sense of profound physical depression, the ever-present stench, and the symptoms arising from embarrassment to the functions of important organs, render the picture truly pathetic. Unfortunately, the mind remains clear to the last.

The temperature is not elevated unless complications are present. The pulse is not influenced until the general health depreciates. It then becomes compressible and easily accelerated by exertion.

*Examination.*—In cases of epithelioma the examining finger will, even in the early stages, cause bleeding. After a cauliflower mass protrudes into the vagina it is easily recognized as springing from the cervix. At first the uterus is perfectly movable and the pericervical tissues normally elastic, but soon after the growth begins to bud the tissues about the cervix become infiltrated. Still, large cauliflower growths may be present and the pericervical tissues be of normal consistence. The cancerous excrescence feels irregularly granular, unlike any other growth except condylo-mata. Digital exploration of the vagina in cancer of the cervix furnishes little indication of the nature of any nodule or out-



growth except that it bleeds very readily. Adeno-carcinoma of the cervical canal may be well advanced without indicating to the examining finger any sign of its presence.

Very important evidence is to be obtained even in the earliest stages by the speculum and use of instruments. One characteristic of all forms of cancer of the cervix is its exceeding *friability*. Therefore, cancerous papillomata can be scraped off with the finger-nail; and the slightest touch of the sound, no matter how gently made, will cause adeno-carcinoma to bleed after budding has occurred. If the cervix is nodular and cancerous, the enlargement may be grasped with a coarse tenaculum, and upon making traction the instrument will tear its way through, leaving granular and bleeding surfaces. Cancerous outgrowths are either not covered by epithelium at all, or, if they are, the slightest touch will suffice to rub off these cells. If in doubt whether a nodule be an enlarged follicle or cellular infiltration, it may be punctured, and if cystic, glairy fluid will escape, while this will not occur if the nodule be cancerous. Cancer is not common where there is a very general cystic degeneration of the cervix, even though the cervix be much hypertrophied with the latter. If a cauliflower mass has formed its appearance is very characteristic. It is always pedunculate, its surface denuded of epithelium and covered by a stinking pus and blood, and it is of a granular texture, being rough. If the tissue-necrosis has proceeded so far as to produce ulceration, there will be presented an excavated cervix, the opening being surrounded by an apparently healthy rim of cervical tissue, but the edges always tear easily when grasped by a tenaculum. The floor of the ulcer is nodular, covered by pus, and bleeds when touched. In some cases, particularly in old women, as the disease has occurred after the cervix has shrunk with the menopause, the vault of the vagina may be occupied by an irregular cicatrix some portion of which will be nodular or ulcerated. In such a case the nodules may feel hard, but are easily torn by a tenaculum. If a cancerous nodule is pressed upon by a sharp curette a considerable fragment will readily be removed. This is impossible with any other tissue.

In *adeno-carcinoma* of the cervical canal the external os may appear perfectly normal, or a bud of cancer may protrude through it. In the nodular stage of this form of cancer the disease may be entirely unsuspected even by a skilled gynæcologist, and there

is no means of proving its existence before ulceration or budding begins. Fortunately this occurs early, and then the passage of the sound produces bleeding from the cervical canal. The normal



FIG. 64.—EVERSION OF THE CERVICAL LIPS WITH GLANDULAR HYPERTROPHY. (Cullen.)  
Upon superficial examination simulating epithelioma. Contrast with Fig. 61.

cervical mucosa is very tough and does not bleed readily when touched. Whenever, then, the gentle introduction of the sound into the cervical canal produces bleeding, cancer is to be suspected. After necrosis of the infiltration has begun the cervical canal will



be more or less hollowed out. It is surprising to what an extent this may proceed without there being evidence of the process upon the vaginal face of the cervix. If a small, sharp curette is introduced into the cervix a bit of the cancer can readily be removed.

*Diagnosis.*—The cervical mucosa may extend downward so as to show as a reddened area about the os externum, or the torn cervix may be everted and the mucosa appear. Such a surface is raised, is never pedunculate, has sharply defined edges, is covered by epithelium, and does not easily bleed; it may become inflamed, constituting a *cervical folliculitis* (Fig. 64). If caustic applications be made or violence inflicted upon such a condition, it may produce a true "erosion" with loss of substance, and the resultant ulcer may simulate a cancerous excavation; but beneath the ulcer of inflammation the tissues are firm, whereas the floor of a cancerous ulcer is exceedingly friable and can be dug out with any blunt instrument. In *cystic degeneration* of the hypertrophied cervix, the tissue between the cysts is firm and the punctured cysts evacuate their fluid contents. Neither feature is present where the nodules are cancerous.

*Condylomata* of the cervix differ from epitheliomatous papillomata by being paler, firm, not bleeding when rubbed, and usually attached by a broad base. The condition is very rare. I have seen but one case, in a Syrian woman. The entire cervix was covered as well as the adjacent vagina.

*Syphilis* of the cervix is very rare. The signs are those of similar lesions on other mucous membranes.

*Tubercular* ulcer of the cervix is referred to in its proper place and will readily be differentiated from cancer. It is usually seen in general tuberculosis only (Fig. 65).

*Cervical polypi* may cause irregular discharges of blood and foetid leucorrhœa. They are seen to spring from the cervical canal, are smooth, are not friable, may be single or multiple. They can hardly be mistaken for papillary adeno-carcinoma. *Sub-mucous cervical fibroids* are small and very dense. The overlying mucous membrane is normal—not so in cancer.

The obscurity of the symptoms of cancer of the cervix and the indifference of women to the early symptoms is well shown by the fact that less than 15 per cent of all cases of cervical cancer that come to us admit of a radical operation, 85 per cent having pro-

gressed too far before being discovered. Whenever in doubt regarding the exact nature of a suspected cervix, a portion should be cut out and sent to the most competent authority accessi-



FIG. 65.—CONDYLOMATA AND TUBERCULOSIS OF THE CERVIX AND VAGINAL VAULT.  
(Natural size.) (Cullen.)

The entire cervix presents a rough, uneven appearance, due to coarse lobulations. Its outer margin is represented by an elevated ridge which also shows lobulations, while the vaginal vault surrounding it forms a secondary ridge in front and to the sides. On digital examination the projections were found to be very firm; they slipped easily under the finger and no bleeding followed the manipulation.

ble. With a sharp scalpel a V-shaped piece of the cervix can be painlessly removed and a fine suture applied to close the wound.



*Prognosis.*—Adeno-carcinoma of the cervical canal runs a more rapid course and tends earlier to involve the lymphatics than does epithelioma. This may be due to the fact that the older women are more prone to epithelioma, and in them atrophic changes in the uterus and its lymphatics have taken place. The average of life in cancer of the cervix is less than two years. After the disease has extended to the parametrium, few cases live beyond eight months. Death is due to asthenia, some inter-current disease, or from sepsis.

*Pregnancy* has a marked effect upon the progress of cancer, causing the disease to rapidly extend and producing in six months lesions not to be expected within a year.

*Treatment.*—Cancer of the cervix may be treated by high amputation and cautery, by caustics, by vaginal ablation, or by abdominal ablation. The medical treatment seeks the relief of pain by opiates. The stench is best overcome by a douche of Thiersch solution or by 1-per-cent formalin applications. The author has seen benefit from the internal administration of thyroid extract, both in adeno-carcinoma and epithelioma.

### CANCER OF THE BODY OF THE UTERUS

Very rarely is squamous cell epithelioma of the corpus uteri seen. This assumes the type of an adeno-carcinoma. It may begin at any point within the internal os. The surface epithelium multiplies, new connective-tissue filaments form, and the growth assumes a papillary form upon the surface of the endometrium. There next ensues an actual multiplication in the utricular glands. The cells lining the glands proliferate, the glandular stroma becomes broken in places, and the epithelial cells invade the inter-glandular reticular tissue. The papillæ continue to grow, and may remain as separate delicate processes or, uniting, form one large mass. The glandular or cellular proliferation invades the muscular coat also. After a time the superficial portion of the outgrowth dies and produces a pultaceous necrotic mass which may completely fill the uterine cavity. The uterus enlarges in all cases, and its walls may become so disintegrated by the cancer that the organ becomes elastic and feels like a bag filled with small grain. After a time the disease appears upon the surface of the organ and invades the upper folds of the broad ligament

and higher *glandulæ hypogastricæ*. Secondary metastases upon the vagina are occasionally seen. The disease has little tendency to extend downward, the internal os being its usual limit. The internal os may be blocked by the growth, retention of discharges take place, and a pyometra form. In advanced cancer any one of the inflammatory lesions of the ovaries and tubes may be produced.

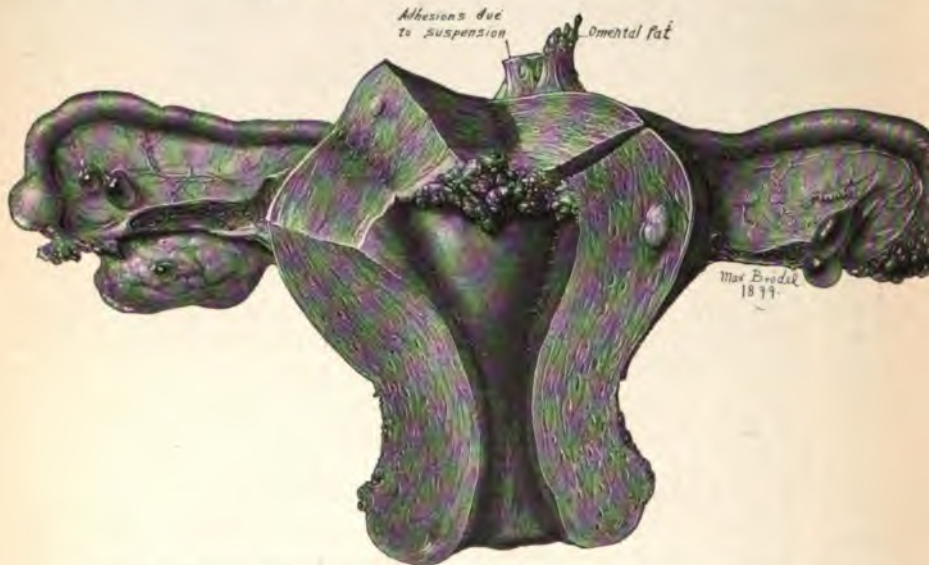


FIG. 66.—EARLY ADENO-CARCINOMA OF THE BODY OF THE UTERUS. ( $\frac{2}{3}$  natural size.) (Cullen.)

The uterus is of the normal size and shape. Attached to the fundus are broad adhesions due to the suspension performed about one and a half years before. Connected with the adhesions are small masses of omental fat. The uterine walls are of the usual thickness, and contain two small myomatous nodules. The mucosa of the cervix, and of the greater portion of the cavity of the uterus, is normal. Springing, however, from the fundus and posterior wall is a finely lobulated growth, which reaches nearly 1 centimetre in thickness, but does not appear to penetrate the uterine walls. This case is of great clinical interest, as the uterus had been examined from above, during the operation for removal of an ovary, seventeen months previous to the hysterectomy. Again, we know positively from microscopic examination that the carcinoma had existed more than seven months before the uterus was removed—a fact which demonstrated the slowness of the growth.

Inasmuch as cancer of the uterine body extends outward between the upper and more elastic folds of the broad ligament an invasion of the tissues outside the uterus may take place without the fundus being fixed; whereas in cervical cancer fixity of the



uterus is one of the first signs of the invasion of the parametrium. Furthermore, for some unknown reason, corporal cancer progresses more slowly than cervical. Again, corporal cancer extends along the lymphatics of the round ligament, and in advanced cases invades the glands about the inguinal canal through which this ligament passes.

*Symptoms.*—The first symptom noticed is usually a watery discharge of a most offensive odour. This odour is entirely unlike that of unclean genitalia, and is identical with that of rotting beef-tea. It irritates the parts over which it flows. This discharge soon becomes blood-tinged. Occasionally the first symptom is a sudden sharp hæmorrhage. If the disease occurs during the menstrual life of the woman, the menses are increased. The normal leucorrhœa is also increased, just as it is in adeno-carcinoma of the cervix and for the same reason; but in corporal cancer this increase is so slight as not to attract the woman's attention. As the disease progresses there is a continuous discharge of foul-smelling bloody discharge, often accompanied by the passage of clots and shreds of tissue.

Carcinoma of the uterine body soon blocks the cervical canal, and hence the retention of the purulent blood causes septic manifestations in the pelvic peritonæum and adnexa much more often than in cervical cancer. The disease is most frequent after the menopause, after the forty-fifth year of age. Women at that time have ceased to have noticeable leucorrhœa and lose no blood. THEREFORE, THE APPEARANCE OF ANY DISCHARGE MUST PUT THE WOMAN ON HER GUARD, AND IF THE DISCHARGE CHANGES FROM A MUCOUS TO A WATERY CHARACTER CANCER IS TO BE SUSPECTED. THIS SUSPICION BECOMES ALMOST A CERTAINTY IF THE DISCHARGE BECOMES PUTRID AND BLOODY.

*Pain* is more frequent in corporal than in cervical cancer. At first it is of a sharp, lancinating character. If the flow is retained expulsive pains may ensue, and if infection occurs, the resulting inflammation causes the pain accompanying the complication. As a rule, there is at an early date a sense of heaviness about the uterus. In contrast with cancer of the cervix, women with corporal cancer are not only not prolific, but about 40 per cent are sterile. The general health of these patients remains good for a long time, but soon depreciates if the discharge becomes retained. The progress of corporal cancer is somewhat slower than

that of the cervix, probably due to the fact that it is most common after the menopause, when the absorbents have begun to undergo degenerative changes.

*Differential Diagnosis.*—Several conditions may cause symptoms similar to those produced by corporal cancer. Fibro-cystic disease of the uterus often causes a watery discharge, and the microscope only can determine the nature of the tissue removed by the curette.

Sloughing mucous polypi may cause irregular bleedings and a putrid discharge, and again the microscope only can differentiate. If a curettage is done for purposes of diagnosis, it must be with the proviso that if cancer be found a radical operation shall follow within a month, for the trauma accompanying curettage opens up new channels for extension of the cancer. Too much stress cannot be laid upon the importance of resorting to the curette as a means for early diagnosis, and this simple operation must cover the entire endometrium. If, however, the scrapings do not show cancer and the suspicious symptoms recur, it is well to remove the uterus, for in certain cases the cancer is situated within the uterine muscularis and in others so high up in a lateral fornix that the curette misses it. THE POSITIVE EVIDENCE FURNISHED BY THE CURETTE AND MICROSCOPE IS INFALLIBLE, BUT THE NEGATIVE BY NO MEANS SHOWS THAT CANCER DOES NOT EXIST.

*Treatment.*—Cancer of the body of the uterus may be treated by either abdominal or vaginal hysterectomy, when a radical operation is indicated. In advanced cases, not admitting of removal, the uterus must be curetted and the cavity thoroughly cooked with the galvano-cautery.

### SARCOMA OF THE UTERUS

This is rare. The disease may originate in either the endometrium or in the uterine wall. When occurring in the endometrium it presents as a smooth nodule or nodules simulating a submucous myoma. Later it may break down and present an ulcerated surface. Within the walls of the uterus sarcoma simulates intramural myoma. The type may be either round-cell or spindle-cell. The disease tends to extend outward between the folds of the broad ligament and through the uterus by continuity of tissue. It usually occurs before the menopause.



*Symptoms.*—While the tumour is in the nodular stage and before necrosis begins, the symptoms are those of fibro-myoma. After the growth has begun to break down carcinoma is suggested



FIG. 67.—A ROUND-CELL SARCOMA OF THE BODY OF THE UTERUS. (Natural size.)  
(Cullen.)

The uterus is considerably enlarged and its walls are thickened. The cervix is intact; its mucosa, as well as that lining the lower part of the uterine cavity, is normal in appearance. Occupying the greater part of the cavity is a new growth. This is sharply defined from the surrounding mucosa, and has springing from its surface delicate finger-like or polypoid outgrowths. It would be impossible, macroscopically, to differentiate between this growth and an adeno-carcinoma of the body.

by the symptoms. The uterus is generally much enlarged, movable unless fixed by extension of the sarcoma to the parametrium or by inflammatory exudate, and not sensitive. Neither by symptoms

nor examination can the diagnosis be made. It is not possible to differentiate without the use of the microscope.

*Treatment.*—If the diagnosis of uterine sarcoma is made it calls for abdominal hysterectomy when the uterus is so enlarged that it cannot be removed *en masse* through the vagina; but when this latter procedure is possible the vaginal route is preferable.

*Sarcoma of the cervix* is exceedingly rare. It occurs in early womanhood. The type may be one of a bunch of grape-like bodies hanging from the cervix, rapidly extending and filling the vagina. These vesicular masses are filled by viscid fluid, are transparent and easily ruptured. Or the type may be one of an enlarged cervix which is nodular, the stroma being infiltrated by round cells. The disease in both forms tends to necrosis and the production of blood and sanious pus. Rapidity in growth will suffice

to distinguish the disease from other cervical lesions. The microscope will readily confirm the suspicion.

The disease calls for the abdominal removal of the uterus and upper third of the vagina, because when operating through the vagina it is impossible to remove sufficient of the vagina and parametrium.



FIG. 68.—SARCOMA OF THE OVARY.

The growth was associated with multiple uterine fibroids. F, Fallopian tube; C, cystic portion of the sarcoma. The drawing very beautifully shows the medullary structure of the tumour. Vagino-abdominal ablation of uterus and tumours.

### SARCOMA OF THE OVARY

This may occur as a round- or spindle-cell infiltration of the ovarian stroma, or there may be myxomatous tissue mixed with the

typical cells of sarcoma. The ovary is enlarged, highly vascular, lobulated, and fractures easily upon rough handling.

If the vessels which pervade the tumour are very numerous and enlarged the disease assumes the type of angio-sarcoma. The tumour is of rapid growth and is usually seen during the child-



bearing period of life. In gross appearance the tumour may look like splenic tissue or brain tissue. Or it may be cystic. As a rule, the tumours are solid. The disease extends through the lymphatics and veins, and metastases are early found (Fig. 68).

The *symptoms* are those of a rapidly growing solid ovarian tumour. But in sarcoma continuous dull pain in the affected organ is a pretty constant symptom and occurs early in the disease. Ascites occurs early, and the uterus is prone to enlarge under the stimulus of the increased circulation attending the growth of the ovarian sarcoma.

*Treatment.*—If the tumour is of small size it alone should be removed by the abdomen, the tube and ovarian ligament being ligated and cut away close to the uterine cornu, while the outside ligature on the ovarian artery should be at the pelvic brim. But if there be any doubt as to the ability to make the dissection wholly within normal tissue the uterus and opposite adnexa should also be removed by laparotomy, for the disease readily invades all tissues adjacent to its origin.

### DECIDUOMA MALIGNUM

This is a malignant growth occurring during or after pregnancy, occupying the placental site, and characterized by a tendency to become rapidly diffused by direct extension and through the agency of metastases.

The growth probably arises from foetal structures. It is composed of an alveolar structure, the cavities filled with blood and fibrin and not lined by endothelium. Between these spaces are cells resembling decidual cells and syncytium elements. The growth is of reddish colour, irregular form, exceedingly friable, and shows areas of necrosis. The uterine tissue surrounding it is usually infiltrated. Metastases in the lungs and vagina occur in over half the cases, while less frequent in other organs. The growth extends rapidly and tends to invade adjacent organs. It early necroses.

*Symptoms.*—In about half of the cases the patient has recently aborted and discharged a hydatidiform mole. Repeated and profuse hæmorrhages first occur and show that some grave lesion is present. This is soon followed by putrid and excoriating discharge and pelvic pain. The patient rapidly becomes anæmic,

septic phenomena or symptoms of lung involvement supervene, and death ensues within six months. The disease usually occurs within the post-abortion or post-partum month. Upon examination the cervix is found enlarged and softened. In half the cases irregular nodular growths will be found upon the vulva or vagina. These are of rapid growth, of deep colour, very friable, and soon ulcerate. If the finger can be introduced into the uterus, the nodules may be felt and scraped off with the nail. In every case of hydatidiform mole this disease is to be suspected, and in every case of late post-partum hæmorrhage it must be looked for. Therefore, a diagnostic curettage must always be done at once under both circumstances, for only by early diagnosis can the patient be saved.

*Treatment.*—If the disease be limited to the uterus, abdominal hysterectomy should be performed (see Abdominal Hysterectomy in Cancer). In the inoperable cases all the physician can do is to relieve pain and employ local cleanliness.



## CHAPTER IX

### *DILATATION OF THE CERVIX*

THE cervix may be dilated for purposes of intra-uterine examination or operation. There are two methods of dilating the cervix—the gradual and the forcible. Sometimes both must be employed, the forcible following the gradual method.

*Gradual dilatation* of the cervix may be secured in a number of ways. For a long time gynæcologists have known that the cervix will soften and dilate around any foreign body which is left within it. If a filament of iodoform gauze is passed into the cervical canal and through the internal os, in twelve hours the cervix will be found more open and softened. Then a larger strip can be inserted and left in for a day. In this way each day inserting strips of gauze of increasing size, a dilatation of over a half inch in the diameter of the cervix can be secured. Through this the uterus can be packed with strong iodoform gauze in a case of endometritis, or it may be curetted. However, this method of gradual dilatation is employed generally in cases which need a curettage and cannot take ether. Very little pain is produced by it.

The most usual method of gradual dilatation is by means of tents of laminaria or other material which swells when wet. In pre-antiseptic days this method was much used and was justly condemned because it so often produced pelvic peritonitis. The tents can, however, be perfectly sterilized by dry heat. The patient should be in Sims's position, a nurse holding back the perinæum with a short speculum. The operator draws down the cervix with a blunt bullet forceps hooked into its anterior lip. He then touches the entire cervical canal with pure carbolic acid and introduces into the canal a sterile laminaria tent which is well lubricated in boroglyceride. A snug tampon of iodoform gauze is placed in the vagina to hold the tent in place. In twelve hours

the dressings are removed and the swollen and softened tent withdrawn. It will now be found possible to insert two tents into the cervical canal. These again are removed in twelve hours, the uterus washed out with bichloride-of-mercury solution (1 to 10,000) and three tents inserted. When these are withdrawn in six hours, it will be found that the finger can readily be introduced

into the uterine cavity, and the uterus is prepared for the removal of intra-uterine growths.

The treatment is painful and the patient must be kept gently under the influence of opium.

Gynæcologists recalling the destructive pelvic lesions formerly produced by the unclean use of tents have apparently given them up entirely. Under our present precise methods of cleanliness, this valuable method of preparing the cervix for intra-uterine operations is perfectly safe. It should never be employed in the presence of inflammatory ad-



FIG. 69.—FORCIBLE DILATATION OF THE CERVIX BY MEANS OF THE TWO-BLADED DILATOR.

nexal disease nor when septic or gonorrhœic endometritis exists. The degree of dilatation secured by the use of tents is rarely demanded except for the purpose of removing intra-uterine fibromyomata.

*Forcible dilatation* of the cervix is employed for the purpose of curetting the uterus and to enable the operator to reach the uterine cavity for other operative purposes. It is also employed



by some to relieve dysmenorrhœa and sterility under the mistaken belief that the cervical obstruction causes both conditions. Dilatation of the cervix a few days preceding menstruation undoubtedly somewhat relieves that form of dysmenorrhœa which is associated with anteflexion, and it does this because it produces a softening of the entire organ and causes a gradual flow of blood to the endometrium rather than the usual sudden congestion. But each month the procedure must be repeated to maintain even a slight relief. The procedure is objectionable in that it inflicts a trauma upon the uterus without the protection of technical cleanliness. The sterility for which dilatation is done is not due to closure of the cervix but to an abnormal endometrium. Spermatozoa cannot only pass a cervical canal which easily admits a probe, but may also be found in the Fallopian tube the lumen of which is many times smaller than the most stenosed cervix. Lastly, other means are far more effective than dilatation in relieving dysmenorrhœa, and are less harmful. Forcible dilatation for purposes of intra-uterine examination and operation is a valuable aid to our operative technique. It should be done by means of a branched dilator, and may be preceded by gradual dilatation and accompanied by incision of the vaginal portion of the cervix in one or more directions. Some minutes should be consumed in the procedure, the full dilatation being secured by an intermitting pressure rather than one which is continuous. The cervix may often be opened by a combination of gradual and forcible dilatation to permit the removal through it of fibro-myomata of 3 inches diameter, or at least to an extent which will permit the morcellation of intra-uterine growths of that size.

### CURETTAGE

*Indications.*—Curettage of the uterus may be performed to remove an abnormal endometrium which causes dysmenorrhagia and sterility, to remove retained placental tufts, to induce involution in the uterus, to check the bleeding due to fibro-myoma, to remove specimens for examination and diagnosis, and as an important step in the operations performed for the various infections of the uterus. The operation is best performed with the sharp curette of Sims. Only where isolated tufts of placenta have been retained is the dull curette indicated. The instruments

needed are: 1 Jackson retractor, 1 Sims sound, a set of Sims's curettes, blunt bullet forceps, uterine dilator, blunt straight bistoury, tampon screw, dressing forceps, uterine packer, Fritsch-Bozeman irrigators, fountain syringe. Inasmuch as a raw surface is to be made within the uterine cavity, connected as the latter is with the peritoneal cavity by lymphatics and open Fallopian tubes, the most technical cleanliness is to be employed. To illustrate how carelessly this most valuable operation is often performed, I am sure I have performed as many vaginal hysterectomies for pelvic pus due to unclean curettages as for lesions due to disease. If due care is exercised in its performance, curettage of the uterus is devoid of danger.

*The Operation* (Fig. 69).—The patient is under general narcosis, and in the lithotomy posture. The perinæum is retracted and the cervix pulled down by bullet forceps, which an assistant holds. The direction and depth of the uterine canal are next determined by the sound. The cervix is then dilated. In performing this important step of the operation a branched dilator should be employed, one which is opened by hand-squeeze alone and not by means of a screw. Unless such an instrument be used, the dilatation cannot be secured by intermittent force, as it should; and in case tearing begins in a cervix unsuspectedly friable, the force could not be released. The dilatation is obtained by turning the dilator a little from side to side as the hand is closed over the handles, so that all parts of the cervix may feel the force. Some minutes are needed for a proper dilatation if the cervical tissues be inelastic. The degree of dilatation will vary somewhat according to the disease for which the operation is done. If for sterility, a dilatation of at least  $\frac{1}{2}$  an inch is necessary; otherwise the cervical ganglia, upon which are dependent those uterine cramps of which some patients complain and which force out the packing, will not be prevented. As a rule, the dilatation must be proportionate to the size of the uterine cavity. It should always be sufficient to allow the passage of a large curette and irrigating tube in large uteri. If the cervix be stenosed it may be incised bilaterally. After the cervix is dilated the curette is introduced to the fundus and withdrawn in such a way that the cutting edge scrapes along the endometrium in a straight line. The blade of the instrument should be pressed hard against the endometrium, but the cervix must not be used as a fulcrum. The entire circumference of the



cavity is gone over, particular attention being paid to the lateral angles and tubal openings. If the curette is introduced gently and the scraping done as described, there is no danger of going through the uterus, even if soft spots of necrosis be encountered. The depth to which the scraping shall penetrate will depend much upon the state of the uterus, and is determined by experience largely. In hard uteri, such as the sterile, the fibroid, and the old subinvolved, a grating will be felt at all points from which the endometrium has been removed, and a spot producing this as the curette passes over it a second time is sufficiently scraped. But in cases of cancer, sepsis, in puerperal and other soft uteri, a nice touch alone will govern exactly the depth to which the scraping should proceed.

AS A RULE, THE SOFTER THE UTERUS THE LARGER SHOULD BE THE CURETTE, for perforation of the uterus is easiest where small curettes are used in large, soft uteri.

After the curettage is finished, the next most essential step is removal of all *débris* and fragments of endometrium. In small uteri this is done by swabbing out the cavity with iodoform gauze, while in large cavities the swabbing is preceded by irrigation (Fig. 70).

To swab out the cavity, a single thickness of a strip of gauze is laid over the blade of the curette and introduced into the uterus. As the curette is moved across the uterine cavity the *débris* becomes caught in the gauze. Repetitions of this should be made until the gauze returns without showing fragments of tissue. When a large curette has been employed a large irrigator must be

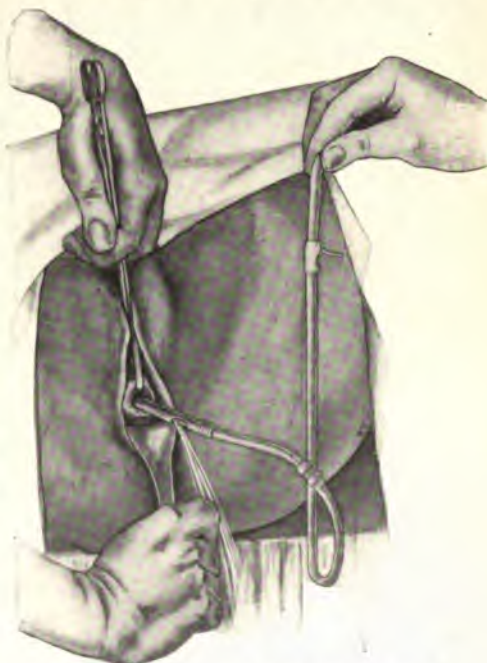


FIG. 70.—IRRIGATION OF THE UTERUS WITH A FRITSCH-BOZEMAN TUBE.

used, for large curettes produce large fragments. I employ the Fritsch-Bozeman double-current irrigator, the largest size of which has a diameter of  $\frac{5}{8}$  of an inch and is used in puerperal cases only. The sterile fountain syringe makes the best irrigating bag. Several quarts of sterile salt solution are allowed to pass through the irrigator. The uterus is again swabbed dry. I now, and invariably, pack the uterine cavity full of iodoform gauze. There



FIG. 71.—PACKING THE UTERUS WITH IODOFORM GAUZE BY MEANS OF A HEAVY APPLICATOR.

are several reasons for this. It checks and catches all oozing. It furnishes an absolute protection to the cells while they are reproducing a new endometrium, and when the lymphatics are invaded by germs of infection it undoubtedly drains. As the iodoform gauze is put up, it is in yard widths folded 9 times, and of 5-yard lengths. A piece cut across the length of the dressing will give, when unfolded, a strip of a yard length and of such width as the operator has chosen to cut it. A sterile uterus will receive 1 yard of gauze 1 inch wide; the full-term

uterus will take a piece a yard wide and 5 yards long. Between these two extremes the amount of dressing to be introduced varies according to the size of the uterine cavity. The cavity of the uterus is tightly packed and the filament passing through the cervix is loose. It is improper to pack the cavity loosely and plug the cervix tightly (Fig. 71). I introduce the gauze upon the point of a heavy applicator which has been curved to the canal, when the



uterus is small; but with large cavities and widely dilated cervixes the gauze may be introduced either by tampon screw or long, narrow-bladed dressing forceps. The illustration shows the gauze being introduced into a uterus which had aborted at the second month. The uterine cavity being filled, the vagina is loosely packed with iodoform gauze.

Experiments upon animals, as well as examination of uteri which had been curetted some weeks previous to a hysterectomy, show that not only is the endometrium completely reproduced in about four weeks, but that the new membrane is a histological structure. Although the operator may remove all the endometrium down to the muscularis, the embryonic lymphoid structures will produce a new one. This reproduction needs no aid from us, only protection against injury, either chemical (as strong antiseptics) or bacterial. This protection is amply afforded by the non-irritating pack of iodoform gauze. And inasmuch as all other antiseptics are destructive of plasma cells, the operator should not, after curettage, paint the raw surfaces he creates with carbolic acid, iodine, or other antiseptics.

The intra-uterine packing is to be removed in two or three days, the shorter time in small uteri.

It is not renewed in such cases, but the vagina is lightly re-packed and the patient allowed out of bed. In three days this dressing is removed. This is the last treatment. The first coitus is not before four weeks. When the curettage has been done on a uterus which is enlarged with a cavity of 5 or more inches, I occasionally introduce a second drain of gauze through the cervix to the fundus merely to prevent the cervix contracting too soon. This I always do if the operation has been done upon a uterus infected post-abortion or post-partum. But even in such cases the irrigation is not repeated unless the withdrawal of the first pack is followed by a large amount of pent-up bloody tenacious discharge.

Another popular method of packing the uterus is through a cannula. This is useful when but partial dilatation has been employed, but when the stretching is complete it is unnecessary.

Certain operators employ a plug of hard rubber or glass, grooved or perforated for purposes of draining the uterus after curettage. Even were these superior to iodoform gauze as drains, I would advise against their use, because in about 65 per cent of

the cases we curette the cervical mucosa contains germs which are known to produce pus, notably gonococci, staphylococci, and colon bacilli. To connect this infected field with the recently curetted endometrium is to invite endometritis. In fact, it may be surmised that much of the discharge which the advocates of the draining plug proudly point to is due to a complicating infection, and that it is caused by the plug.

In doing all after-dressings, the preferable position for the patient is Sims's, the perinæum being retracted by a short Sims speculum, and the urethral area so covered by the trowel that the dressings are not soiled when introduced.

### BILATERAL INCISION OF CERVIX

*Indications.*—It is known that the normal cervical canal is a bilateral slit, sometimes curved. Contraction in this may take place at any point of the canal, most commonly at the os internum. The older surgeons observed this and ascribed to it a multitude of ills, notably dysmenorrhœa and sterility. Their methods of treatment demonstrated two things: namely, that dilatation of the cervix with bilateral incision very often cured dys-

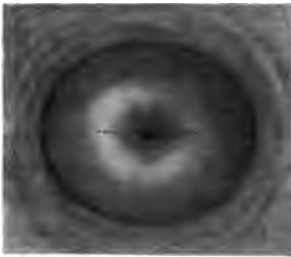


FIG. 72.—BILATERAL INCISION OF THE CERVIX.

The dotted line indicates the extent of the incision in the vaginal face of the cervix.

menorrhœa, and that if the incised cervix be kept open even for a few days, the canal will permanently be of more normal dimensions. The scientific reason for these two indisputable clinical findings is yet to be given. We accept the unexplained facts. Bilateral incision of the cervix is indicated whenever dilatation and curettage is performed in a case of simple ante flexion with stenosed cervix (see Fig. 25).

*Operation* (Fig. 72).—The sound determines the direction and contour of the cervical canal. The blunt-pointed, straight bistoury is introduced through the internal os, and this is incised upon each side just through the mucosa. As the knife is withdrawn the vaginal portion of the cervix is cut first upon one side, then upon the other, so as to make an incision two thirds of the cervical diam-



eter. The gauze packing which is introduced after the curettage, tends to keep the cut edges apart, and the cervix never after closes as it was before. The operation is very similar in its effect to internal urethrotomy and is entirely devoid of risk. The incision may also be kept open by the cervical plug of Sims or the drainage-plug of Wylie. Both are open to the many objections attaching to the use of the stem pessary, and are never employed by the author.

### ANTERO-POSTERIOR INCISION OF SIMS, MODIFIED

*Indications.*—Whenever there exists antelexion with retroversion and unequal enlargement of the portio vaginalis, the hypertrophy of the posterior lip being less than  $1\frac{1}{2}$  inch, this operation is indicated. If the hypertrophy be greater than this, either Dudley's operation or amputation is indicated. The operation is based upon the observation of Sims that if the posterior lip be incised and the incision be kept open, the hypertrophied cervix will shrink, the uterine canal become more straight, and the uterus assume a higher and more anterior position in the pelvis.

*Operation* (see Fig. 26).—The cervix is drawn down by a blunt bullet forceps hooked into its anterior lip. A blunt-pointed, straight bistoury is then inserted

through the internal os, its edge backward, and with-

drawn in such a way that the internal os is nicked while the vaginal face of the cervix is cut through two thirds of its posterior lip. The bistoury is then again inserted and the anterior border of the internal os is nicked. The uterus is now thoroughly dilated and curetted. The cut edges



FIG. 74.—THE COMPLETED OPERATION.



FIG. 73.—METHOD OF APPLYING THE TWO RUNNING SUTURES AFTER THE INCISION IS MADE.

of the posterior lip would reunite if not separately sutured. To escape the use of Sims's stem pessary I have devised the method of suturing illustrated (Figs. 73 and 74). The suture material is

preferably kangaroo tendon or chromic catgut. The intra-uterine gauze is removed in two days, and after that for a week only the vagina is kept packed with iodoform gauze. A new endometrium is reproduced in a month, after which coitus and the usual avocations of life are allowed. After this operation the cervix progressively shrinks, the dysmenorrhœa is relieved, the uterus assumes a higher



First step. Removal of the section from the posterior lip of the cervix.



Last step. Removal of the section from the anterior lip of the cervix.

FIGS. 75 AND 76.—DUDLEY'S OPERATION FOR ANTEFLEXION.

position in the pelvis, and sterility is relieved in 60 per cent of the cases. During the first months of a succeeding pregnancy the nausea is much less than in cases of similar flexion not so treated.

#### DUDLEY'S OPERATION FOR ANTEFLEXION

*Indications.*—This operation is performed in the same class of cases as the last operation, but is particularly indicated where the



cervix is enlarged in all its diameters and associated with ante-flexion.

*Operation.*—The cervix is incised through the posterior lip, just as in the modification of Sims's operation. From each raw surface so created a wedge-shaped piece is removed at about its middle. The sutures are then passed as illustrated (Figs. 75 and 76). Now, from the anterior lip of the cervix an oval piece is cut and sutured bilaterally. This last step is not always necessary, only when the anterior lip is disproportionately enlarged. The benefits from this operation are still further substantiated if the uterus be thoroughly dilated and curetted at the same sitting. The operation occupies a position between my modification of Sims's procedure and amputation of the cervix.

### AMPUTATION OF THE CERVIX

*Indications.*—This may be performed for hypertrophy, for laceration with hypertrophy, for inflammatory disease of the mucosa cervicis, to fold in the vaginal vault in prolapse, and to remove the portio vaginalis in other diseased conditions. There are two distinct types of amputation: one in which not only is a portion of the cervix removed but a new canal formed, and the other, the operation of Sims, which purposely avoids the creation of a new canal.

*The Amputation of Schroeder, Modified.*—The cervix is incised bilaterally so as to create two flaps. The incision to effect this must proceed somewhat above the point at which the tissues are to be amputated (Fig. 77, A). The next step will depend a good deal upon whether the operation is performed for the purpose of removing a diseased cervical mucosa or hypertrophied tissue. We will assume that it is for hypertrophy with a general cystic degeneration and laceration. Upon the anterior flap and at right angles to the direction of the cervical canal, a transverse cut is made across the face of the flap to the depth of about  $\frac{1}{4}$  inch (Fig. 77, B). Another cut is made obliquely down through the tissues of the cervix to join this so as to remove a wedge-shaped piece (Fig. 77, C, and Fig. 78). The same procedures are gone through with the posterior lip. The centres of these two incisions upon the vaginal face of the cervix are now united to the cervical mucous membrane by 3 sutures of kangaroo upon each lip (Fig. 77, D,

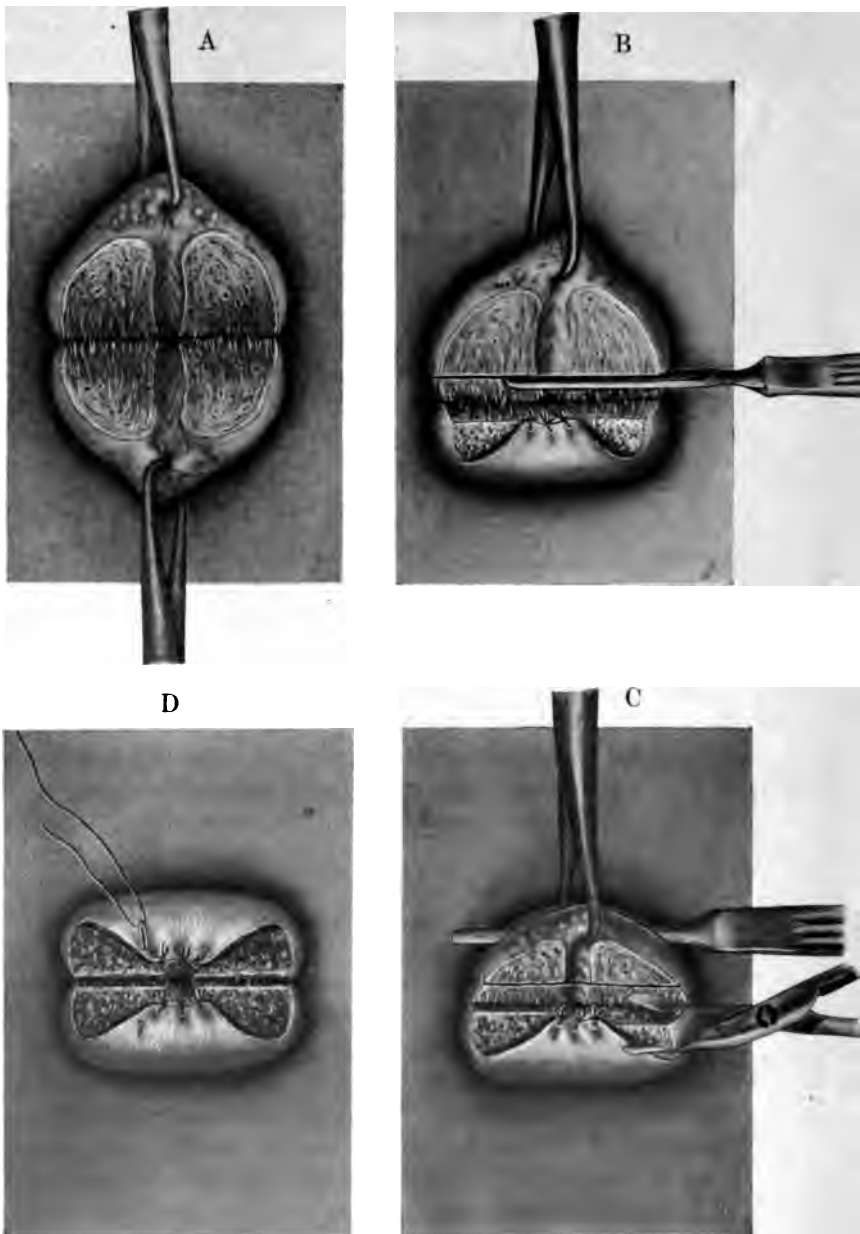


FIG. 77.

- A. The cervix has been split bilaterally so as to make two flaps. B. The amputation on the posterior flap is completed and is being done on the anterior. C. The scissors is shown cutting away the redundant portions of the bench. The knife is completing the amputation of the anterior flap. D. The new external os is completed, and through-and-through sutures are applied to close the angles. Cystic degeneration of the glands of the cervix is seen in A and B. These are removed by the operation.



and Fig. 79). There will thus be made both the anterior and posterior lips of the new external os (Fig. 77, D). It will now be found that upon each side of this new os externum there are 4 knobs of tissue, and these are cut away with scissors (Fig. 77, C) so as to produce the appearance of Fig. 77, D. The resultant raw surfaces are now united by through-and-through sutures. If there is much tension, or if the operation is performed as a step in the series of plastic operations for the relief of prolapse of the uterus, it is well to have the sutures next the cervical canal of 26 silver wire. Otherwise all sutures may be of absorbable material. The complete operation is shown in Fig. 80. THE ADVANTAGE OF THIS OPERATION OVER TRACHELORRHAPHY IS THAT IT NOT ONLY MAKES

A CERVICAL CANAL MORE NEARLY NORMAL, BUT IT ALSO ENABLES THE OPERATOR TO REMOVE ALL THE DISEASED TISSUES OF THE CERVIX, WHETHER OF THE PORTIO VAGINALIS OR OF ITS CANAL. If the cervical mucosa be particularly diseased, as in polypoid degeneration,



FIG. 79.—SHOWING METHOD OF FORMING THE NEW EXTERNAL OS.

the transverse incision across the cervical canal may be made high up, while the oblique cut to join this from the vaginal face of the cervix may be made correspondingly low down. And the operation may be modified so as to spare most of the cervical mucosa and remove a maximum amount of the portio. The operation is applicable to all forms of cervical hypertrophy, whether in the virgin or in the multiparous. If dilatation and curettage are done at the same sitting, these steps should precede the amputation. THIS OPERATION SHOULD NEVER BE PERFORMED WHERE A PURULENT ENDOMETRITIS EXISTS OR IN THE PRESENCE OF ADNEXAL DISEASE. To do otherwise is to invite suppuration in the line of

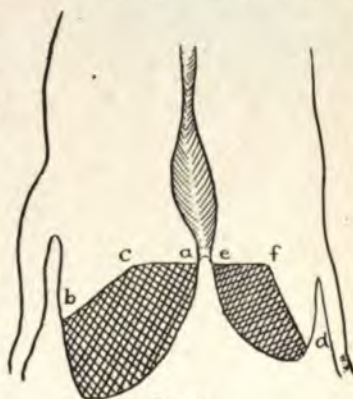


FIG. 78.

The shaded portions are cut away; *d* is to be united to *e*, and *b* to *a*.

suture and retention within the uterus of infectious products in the first instance, and is to run the risk of lighting up latent adnexal inflammation in the latter.



FIG. 80.—THE COMPLETED OPERATION.

### TRACHELORRHAPHY

*Indications.*—This operation may be performed whenever the cervix is lacerated. As the operation necessitates preservation of a strip of cervical mucosa throughout its length, it must leave such glands in this as are diseased and such cysts as lie beneath this strip of mucosa. Furthermore, it forms a cervix which is conical and a canal which is too long and circular. The operation once popular is now little employed, having been almost wholly supplanted by the amputation just described.

*Operation* (Fig. 81).—Upon each side of the cervical canal a piece of tissue half-moon in shape is removed. This may be done either with knife or scissors. If the laceration is unilateral, this piece of tissue is removed upon the side of the tear only. The denudation should proceed so deeply at the angles of the laceration (if this be bilateral) that the dense tissue usually there is removed, and the denudation must be so shaped in all its dimensions as to permit easy approximation of the raw surfaces created. There must be no rolling in or straining of the approximated surfaces. The sutures are to be applied as in the illustration. The suture material may be of silver wire or of absorbable material. There are the same contra-indications here as in amputation of the cervix. If cysts are met with, they should be punctured. The bleeding caused by the operation is slight and is controlled by the sutures.

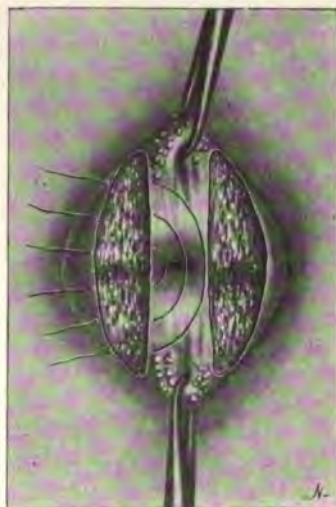


FIG. 81.—TRACHELORRHAPHY.

Notice how the operation leaves the diseased glands beneath the central strip of cervical mucosa.

### THE CONICAL AMPUTATION OF SIMS

*Indications.*—This operation is performed for one condition only, cancer of the cervix, and then only when the local lesions and general physical state of the patient exclude the propriety of a radical operation. It may be done either with knife and scissors, followed by the actual cautery, or by cautery knife.

*Operation.*—The two lips of the cervix are seized by bullet forceps. The knife is entered upon the anterior face of the cervix at the cervico-vaginal juncture. By means of a sawing motion a cone-shaped piece of cervix is removed so as to include the internal os or extend even higher up inside the uterus. After all appreciable portions of the cervix are removed the uterus is curetted, and the entire inside of the organ is thoroughly cooked

by the galvano-cautery. The endometrium must be entirely destroyed so as, if possible, to prevent menstruation; otherwise the seat of the cervical amputation would lock in uterine discharges when the scar contracts. The operation may be further extended by dissecting up the pericervical tissues so as to expose the higher portions of the cervix and admit of their amputation. The oozing surfaces should be packed with iodoform gauze, which may be removed in two days, after which daily douches of mild antiseptics are given. When the slough due to the cautery separates, the wound may be further cauterized or allowed to close, according to indications. If during the operation a spouting arterial trunk is exposed, it may be choked by passing around it, by means of a curved needle, a stout wire or silk ligature.



## CHAPTER X

### PERINÆORRHAPHY

*The Immediate Operation.*—So soon as the placenta is delivered and the uterus has firmly contracted, the torn perinæum should be repaired. The vulval tissues after delivery are deeply coloured, swollen, and exceedingly friable. It is wise to wait a few hours before suturing the wound while the œdema subsides, during which the operator can prepare for the operation, the torn surfaces in the meantime being covered by sterilized gauze. If the tear be only through the superficial muscles sterile cocaine of 4-per-cent strength may be laid over the raw surfaces for a few minutes before passing the sutures of fine tendon. These should not pass just beneath the raw surface, but should have a firm hold of all the tissues which have retracted.

In more extensive tears, particularly if through the sphincter ani muscle, a more elaborate system of suturing is necessary. There is little retraction of the muscles as yet, and the tension is not great; therefore, in complete lacerations, tendon sutures will suffice throughout. But when the bowel has been entered, the wound at once becomes infected and a serious complication is presented. Under chloroform, a running suture of fine tendon is used to bring together the margins of the rectal and anal mucous coats. This effectively closes the bowel. The wound is then irrigated with sterile saline solution and wiped with gauze until every particle of filth has been removed. The vaginal rent is then closed by interrupted tendon sutures, each suture being tied as passed. Upon reaching the sphincter I bring together its edges by means of No. 27 silver wire, care being taken to so apply the lower suture that no dead space will be between the sphincter and bottom of the rent in the perinæum. The wound should be kept irrigated with saturated solution of boric acid. For three days after the operation the patient should be kept on liquid diet.

On the fourth night a full dose of castor oil should be given. This laxative more than any other softens and lubricates the hard scybalous masses. The wire sutures are removed in two weeks.



FIG. 82.—INCOMPLETE LACERATION OF THE PERINEUM.

Opposite the middle finger of each hand the "angles" or retracted fibres of the levator ani muscle and fascia are seen, covered by corrugated false vaginal tissue. Between these angles is seen a protrusion, the "rectocele," formed by vaginal and rectal tissues. Above this the prolapsed urethra and bladder are seen forming a "cystocele."

**Incomplete Laceration.** — *Colpo-perinæorrhaphy* (Fig. 82).—Inasmuch as the operation will produce a fixation of the tissues overlying the rectum, the bowels should be thoroughly evacuated the day previous to the operation, and only such food given as will produce little fæces. To allow the bowels to contain large scybalous masses which will pass to and distend the rectum and be forced out during the convalescence invites failure of union between the raw surfaces which have been approximated over the rectum. The local cleanliness is that which precedes a

vaginal section. The patient is preferably in the lithotomy posture, the operator comfortably seated at her buttocks. At a point upon each side of the vulva where the margins of the hymen merge into the vaginal wall a small piece of tissue is snipped off with scissors. Assistants then draw open the vulva and the operator de-

presses the perinæum with his fingers so as to expose the "crest" of the perinæum upon the posterior vaginal wall. He snips off a bit of tissue at this point. Straight lines drawn from the central denuded spot up in the vagina to the lateral marks on the vulva should pass above or external to the retracted lateral angles. If such straight lines pass below or through the lateral retracted angles, the marked spots upon the sides of the vulva must be made higher up or the straight lines be made to curve outward and upward. A narrow strip of tissue is now removed along the posterior muco-cutaneous border of

the vulva so as to connect the two lateral marks (Fig. 83). Or, the operator may now pass two fingers of the left hand into the rectum and draw the rectocele forward so as to expose the denuded spot over the crest of the perinæum, and while assistants widely draw apart the vulval edges, he lightly marks with a scalpel the lateral borders of his intended denudation. After this all cutting is done with short, blunt-pointed scissors, curved on the flat (Fig. 84). The vaginal skin is removed in narrow



FIG. 83.—THE FIRST STEP IN DENUDATION FOR COLPO-PERINÆORRHAPHY.

The white lines indicate the boundaries of the denudation in the vagina.

strips until a raw surface is produced which corresponds to the demarcations already made. In removing these strips of tissue the two fingers in the rectum will be found of inestimable service not only by furnishing a firm point against which to press, but also in estimating the thickness of the tissues between the fingers and scissors and in drawing out the lateral retracted angles. Throughout the operation an assistant plays a continuous spray of sterile saline solution over the wound. Without removing his fingers from the rectum the sutures are passed. Here again the fingers are valuable aids in preventing puncture of the rectal mucosa. The first suture is passed near the crest of

the denudation, and should be of fine tendon. The sutures are of chromic tendon and are a little over  $\frac{1}{4}$  of an inch apart. Each is entered near the edge of the wound and is passed obliquely from above downward and inward to the median line, then upward and outward, to emerge opposite its point of entrance (Fig. 85). Each suture as passed is taken in charge by an assistant, who holds it upward out of the operator's way. When the retracted angles are reached the sutures are of No. 27 silver wire and are

passed upon a carrier. These sutures must approximate the separated fibres of the levator ani muscle and its fascia. They are  $\frac{3}{8}$  of an inch apart and are passed in the following manner: the needle is entered at the edge of the denudation and pushed deeply enough into the tissues beneath the retracted angle to secure a firm grasp of the levator fascia and muscle. As

the operator turns the needle so as to point towards the median line, he will feel the resistance furnished by the muscle and fascia lying over the needle; and if he does not, he will know the needle has missed the structures he wishes to approximate. As he turns the needle towards the middle he makes it pass downward



FIG. 84.—SHOWING THE MANNER OF DRAWING THE RECTOCELE AND VAGINAL ANGLES FORWARD BY MEANS OF TWO FINGERS INSERTED INTO THE RECTUM, SO AS TO FACILITATE DENUDATION.

and inward, not straight across. The needle is withdrawn at the centre and reintroduced beneath the denudation. It is then forced upward and outward, to emerge at the margin of the wound opposite its point of entrance. The utmost care must be exercised not to miss the tissues above the retracted angles, and the needle must be entirely buried beneath the angles as it passes.



The needles are brought out at the centre merely because they cannot pass entirely across the denudation in the proper direction, which is that of an angle the apex of which is at the centre. Scarcely more than 3 wire sutures will be needed within the vagina. As each carrying thread is passed, it is made to draw after it a silver-wire suture. If the needles are not passed as described, but are merely made to travel across from side to side beneath the denudation, the rectocele will not be lifted up nor the retracted levator fibres pulled down as they should be. Still maintaining the same distances between the sutures, the last within the vagina will be inserted just within the border of the hymen. One other wire suture is then passed by entering the needle at the edge of the skin upon the perineal face of the wound. The fingers are now withdrawn from the rectum and the sphincter thoroughly dilated.

The levator and sphincter ani muscles have opposing actions. To approximate the torn levator fibres and leave the sphincter undilated will cause very painful spasmodic contractions in both. If the sphincter is paralyzed by forcible dilatation not only will the pain after the operation be slight, but gases and feces will readily pass. The operator now sterilizes his hands anew. An assistant grasps the upper angle of the wound with a tenaculum and lifts it up while the operator ties the upper sutures of absorbable material. After all the absorbable sutures have been tied each wire suture is then twisted from above downward with

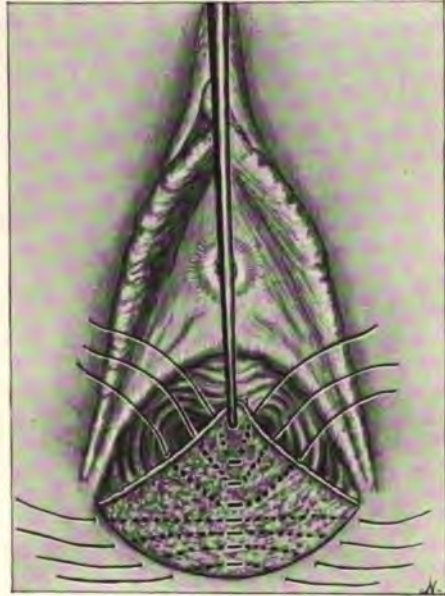


FIG. 85.—THE APEX OF THE RECTOCELE IS HELD UP TO SHOW THE ANGLE AT WHICH THE VAGINAL SUTURES ARE PASSED (SCHEMATIC).

just enough force to secure nice approximation. It may be found necessary to apply approximation sutures of fine tendon between the wires. Upon the perinæum all approximation is by means of tendon. The wires are left long and drawn out of the vulval

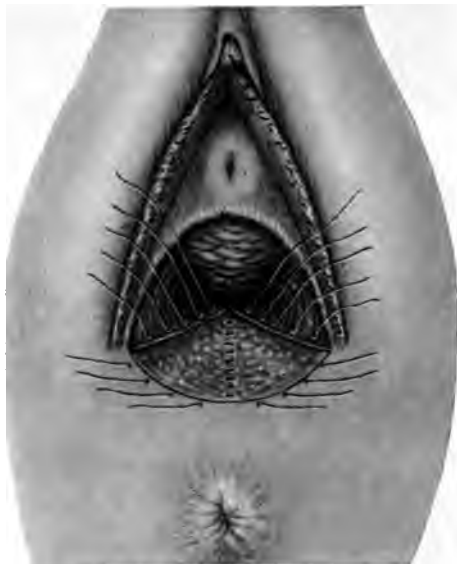


FIG. 86.—SHOWING THE HEIGHT ON THE POSTERIOR WALL OF THE VAGINA REACHED BY THE DENU-  
DATION AND HIGHEST SUTURES.

orifice. A narrow strip of iodoform gauze is introduced upon each side of the sutures within the vagina to keep the anterior vaginal wall away from the line of suture. This is removed in two days and afterward the vagina irrigated daily with sterile saturated solution of boric acid by a careful nurse. The wire sutures are removed in ten days by clipping their loops. It is my practice to keep the patient on liquid food for two days after the operation and to evacuate the bowels by saline ca-

thartics once every second day. Silver wire is used for the tension sutures for many reasons. In the first place, they remain sterile under all circumstances, the loops made with them remain as loops, and do not change their shape under every movement of the muscles through which the sutures pass, and they can be fastened by twisting to the nicest degree of tension and unfastened by untwisting them. This is the method of operating upon incomplete lacerations of the perinæum, which the author invariably employs. Upon consulting the article upon laceration of the perinæum it will be found that this method of operating obeys the requirements of all herniotomies; it reduces the protruded viscus, the rectum, and approximates the muscular and fascial fibres upon whose separation the hernia depends, the levator ani. Stress is laid upon the necessity for securely grasping these fibres beneath

the lateral angles, and upon the angular line in which the sutures should be passed, for only in this manner can the muscle and fascia be drawn down from the "white line" to which they have retracted after being torn (see Fig. 36). Another method of closing the torn perinæum is that devised by Thomas Addis Emmet. Although in cases of torn perinæum I always employ the method first described, there may be found certain cases of long standing in which the muscle and fascia have retracted so far as to render approximation impossible. There are also other women in whom the vaginal outlet is merely stretched, either by repeated child-births, lack of muscular tone, or masturbation with the closed hand. In such the Emmet method of operating effectively narrows the vaginal orifice.

*Emmet's Operation.*—Tenacula are hooked into the points where the hymen merges into the sides of the vulva and are then brought together. If it is seen that they close the vaginal orifice sufficiently, bits of tissue are snipped away from beneath the tenacula. The crest of the rectocele

is now pulled down by a tenaculum and a point snipped from its middle. From this central point and the lateral marks first made, incisions through the vaginal skin are passed up on each side so as to meet at a point a little over an inch up on each lateral

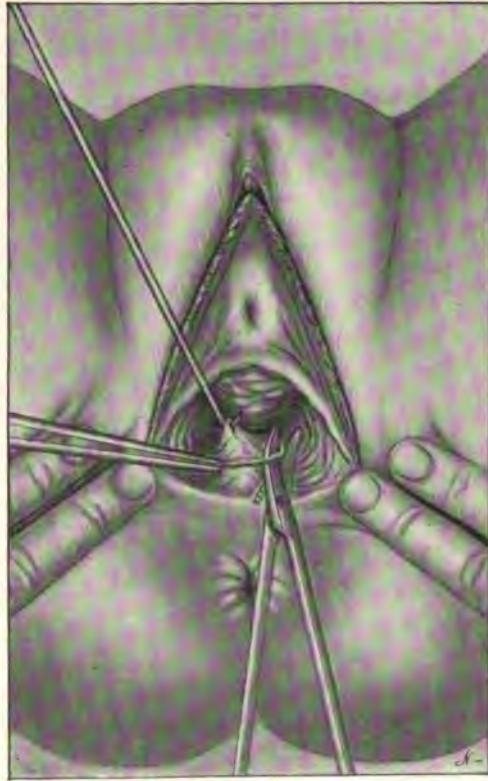


FIG. 87.—THE FIRST STEP IN EMMET'S OPERATION FOR RUPTURED PERINÆUM; DENUDATION OF "THE ANGLES."

angle (Fig. 88). The line of demarcation will now resemble somewhat a spread-out M. The sutures high up in each angle are preferably of fine tendon, but whenever much tension comes upon them they should be of No. 27 silver wire. A description



FIG. 88.—METHOD OF PASSING THE SUTURES IN EMMET'S OPERATION.

of the manner in which they are passed is hardly necessary when the drawings are consulted. It will be seen, however, that this operation also seeks the drawing down of the levator fibres from the "white line" of the pelvis. Denudation is best made with toothed forceps and scissors, and before the sutures are tied the sphincter should be dilated.

After a perinæorrhaphy has been properly performed it should accomplish certain things. The vaginal outlet will have been narrowed to between  $\frac{1}{2}$  to 1 inch in diameter. The narrowing of the orifice is not

merely in its skin covering, but is seen to extend for at least  $\frac{3}{4}$  of an inch up the vaginal canal. The anus has been advanced forward, being drawn away from the coccyx, and will often appear less tightly contracted than before the operation. But the most marked change is in the direction of the vaginal canal. In laceration of the perinæum the examining finger in entering the vagina will pass upward in the direction of the sacral promontory owing to the dilatation and backward displacement of the vaginal orifice, so that the intra-abdominal pressure will bear somewhat in the axis of the vagina. A successful perinæorrhaphy should correct this by lifting the vaginal outlet so that the vaginal axis is much below the plane of the pelvic brim.



The intra-abdominal pressure will then tend to force the anterior vaginal wall against the posterior and keep the vagina closed.

*Complete Rupture of the Perinæum* (see Fig. 37).—In addition to the break in the pelvic floor, the operator has to correct the injury to the lower orifice of the bowel. The operation has, therefore, two distinct stages: the closure of the ruptured gut and the reuniting of the perineal muscles. The field of operation should be cleansed somewhat differently from the usual method, for whatever antiseptics are employed can readily enter the rectum, and that structure is particularly sensitive to the influence of antiseptics. Therefore, it is wise to content oneself with cleansing the parts by soap and water and bichloride-of-mercury solution (1 to 10,000), avoiding lysol, creolin, carbolic acid, and other like chemicals. If any antiseptic solution enters the rectum it should be carefully sponged out, otherwise it may be absorbed and cause poisoning. Inasmuch as the operation upon the bowel is of prime importance, and the organ must be kept inactive after being sutured, it is well to thoroughly empty it by castor oil three nights before the operation, and subsequently keep the patient upon liquid diet. The morning of the operation the rectum and colon should be thoroughly flushed in the knee-chest posture by enemata of saline solution.

*The Operation* (see Fig. 90).—The patient is in the lithotomy position. The operator first

kneads the sphincter ani muscle to stretch it and render it elastic. Upon closing the vulva with the fingers, it will be found that



FIG. 89.—EMMET'S OPERATION COMPLETED.

what appears as a slightly curved line between the sphincter ends becomes a rent in the recto-vaginal septum as the muscular ends are approximated. The denudation of the perinæum

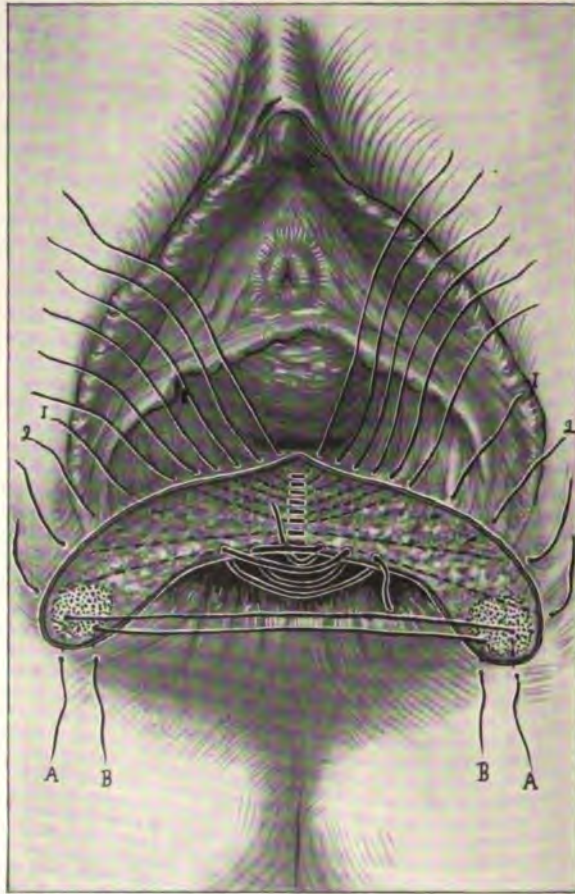


FIG. 90.—THE RATHER COMPLICATED METHOD OF SUTURING IN COMPLETE LACERATION OF THE PERINÆUM.

1 and 2, the coaptation sutures through the skin only; A, B, the sutures which unite the sphincter ani. Above these is seen the running suture which unites the rectal wall.

and vagina is made exactly as in an ordinary perinæorrhaphy (Figs. 83, 84); but as the tear in the recto-vaginal septum is reached, the operator exercises care in denuding the rectal mucosa, not to trim off more tissue than will produce a raw surface

lest disagreeable bleeding be produced. The denudation about the anal orifice should begin over the dimple which shows the seat of the retracted fibres of the sphincter, and from this point be carried around the edge of the thin scar tissue stretching in front of the anus, to again dip down to expose the other end of the sphincter. It is important that all scar tissue over the sphincter ends be removed so as to expose the muscular fibres. The oper-

can pick up a tenaculum. The thin tissue approximated will be able to resist prior vaginal lacerations are united. The vulva may be described on page 100 in Fig. 90. The anal tear up- as to unite the suture also the sphincter the tear with fibres are now a more difficult. The the sphincter manner as to the ends and anal septum. recto-vaginal lacerations should be inevitably remain of failure to in twisting the just sufficient paren- gated by the wise to em- die sphincter,

for the risk of infection is thereby increased. Of all the methods of direct approximation by means of separate and buried sutures, Kelly's is by far the preferable. *However, the difficulties in securing union by the simpler procedure described are largely of the operator's own making.* It is upon the skilful application of the silver-wire sutures that success depends, and if this material were employed with greater frequency and more knowledge of its properties the necessity for departing from old, tried, and proven methods would not arise, and many of the newer operations, however ingenious, would not have seen publication. The application of the methods of Emmet and similar procedures in these cases left nothing to be desired. The failure of those who followed him was due to abandoning silver wire as a suture material and substituting the animal fibres for tension sutures. The advocates of silver wire as a suture material had only experience upon which to base their arguments for it. They were subjected to no inconsiderable amount of ridicule by those surgeons who see nothing good in pure empiricism until experiment proved that under all circumstances silver wire remains sterile, and by its oxidation maintains about itself a sterilized field. These properties show why the older surgeons so generally succeeded with this material. The loudest pleaders for silver wire are now those who formerly decried it, and they carry their enthusiasm even to the point of burying the wire in hernias, a practice which sometimes I follow. The author has digressed somewhat to express his enthusiasm for silver wire, for he at one time abandoned it under the weight of opinion offered against it, to again return to its use. Throughout the operation the wound should be irrigated with sterile saline solution, and whenever the operator's hands touch the anal margin they should be cleansed, but no antiseptics should be allowed to come in contact with the raw surfaces. The deep sutures should be about  $\frac{3}{4}$  of an inch apart, and close approximation may be secured by sutures of tendon. The sutures approximating the sphincter ends are closer together. It is advisable to pass two such sutures through the muscle and a third above and external to it to relieve somewhat the strain upon these two as well as insure against leaving any dead space between the united sphincter and the levator ani fibres.

After the operation is completed, a rubber or glass tube of about  $\frac{1}{4}$  of an inch calibre should be wrapped with a few folds of



iodoform gauze and inserted into the rectum to a point above the apex of the tear, to provide for the escape of gases, which by distending the rectum might burrow beneath the suture line. It should be worn for a week, or until the first stool is had. If it be found that retraction and atrophy in the sphincter has reached so pronounced a degree that the ends of the muscle cannot be brought together without undue tension, the muscle may be split posteriorly just in front of the coccyx by a subcutaneous thrust of the tenotomy knife. This will not require subsequent suture, for the gap in the muscle becomes filled in with scar tissue and the circle is thereby completed.

The *after-treatment* of these cases is of utmost importance. They should be kept on a rigid liquid diet for a week. With our improved dietetics and the great number of prepared foods in the market, the patient can be sufficiently nourished without the ingestion of solid food. The upper end of the tube in the rectum should not be allowed to press upon the line of union in the rectal mucosa, but should extend above it. Wearing a tube in this way will maintain a relaxed condition of the sphincter, a desirable feature when the bowels move. I exclude milk and all its preparations from the dietary because of the hard, caseous masses left after its partial digestion. Chicken broth, with rice water or toast water, squeezed beef juice, Valentine's extract, liquid peptoids, etc., given alternately every four hours will sufficiently nourish the patient. The patient may even have orange-juice and apple-sauce.

On the sixth night the patient is given 6 drachms of castor oil, and some competent person should preside over the morning's defecation so that in case hard fecal masses come down they may be washed away with frequent saline enemata employed placer-mining style, or even broken up with a dull curette.

The sutures are removed on the tenth day, and daily soft stools thereafter secured by cascara sagrada.

The principle governing the after-treatment is perfect rest of the parts until union has taken place.

### ANTERIOR COLPORRHAPHY

The operation is indicated whenever a cystocele is present of such a size as will not be kept up by a colpoperinaorrhaphy, or when a cystocele exists independent of tear in the perinaeum. It is particularly demanded in old women, in whom the residual urine in the vesical pouch produces cystitis, ureteritis, and pyelitis. I prefer the oval denudation. The operator marks a spot on the front wall of the vagina just anterior to the protrusion and another just posterior to the cystocele. Then,

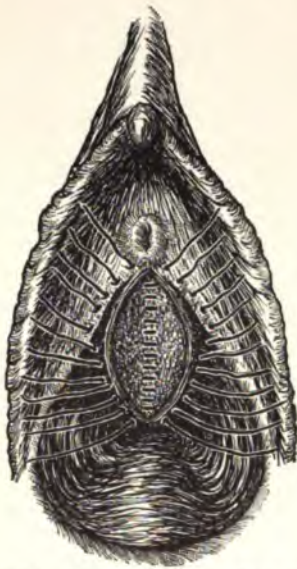


FIG. 91.—THE OVAL DENUDATION FOR CYSTOCELE.



FIG. 92.—STOLTZ'S PURSE-STRING OPERATION FOR URETHROCELE.

upon each side of the anterior vaginal wall, midway between these, he picks up the vaginal skin with tenacula and brings them together in the middle line. In this way he will determine the degree of tension. When he finds two lateral points which will come together with just the proper tension he marks the spots. A curved male sound flattened on the convex side is introduced into the bladder, and upon this all cutting is done. The 4 points on the anterior vaginal wall are now united by curved lines drawn with a scalpel. This surface is then denuded with short curved

scissors and mouse-tooth forceps. After the entire area has been denuded the sutures of No. 27 silver wire are passed as illustrated. In the after-treatment overdistention of the bladder is to be avoided. The wires are removed on the tenth day. It is well to give the patient a douche of sterile boric solution each day, merely for the purpose of prevention of contamination of the line of union.

*Stoltz's Operation.*—This is indicated in small cystoceles and in urethrocele. The denudation is made in a circle, and as all points must be brought to a common centre the requisite degree of tension antero-posteriorly as well as bilaterally must be determined. The suture is entered to one side of the median line, appears upon the raw surface, crosses the median line, skips  $\frac{1}{4}$  of an inch, and is passed out upon the undenudated surface, and in this way is made to circle, like a purse-string, the entire denudation. When this has been accomplished the operator draws the string taut while an assistant pushes up the centre of the denudation with a sound. The suture is then tied. This suture may be of either silk or chromic tendon. If silk is used it must be removed in ten days.

The operation may be done under cocaine anæsthesia, the fluid being injected into the vesico-vaginal tissues. Detention in bed is unnecessary, the patient merely keeping her room for a week.

## CHAPTER XI

### *THE OPERATIONS FOR RETRO-DEVIATIONS OF THE UTERUS*

As has before been said, all operations which seek to maintain the uterus in a normal position must take advantage of, rather than oppose, the intra-abdominal pressure. And to do this the operator must determine whether he will select one of the operations which will hold the body of the uterus forward or one which will fix the cervix high and backward, leaving the intra-abdominal pressure to force the corpus uteri forward. It may be stated as an axiom that the selected operation should not be applied until all pathological conditions in the uterus and its adnexa have been corrected. Also, in fixing the uterus in an anterior position, care must be exercised not to overdo the replacement so as to make the ligaments of the uterus tense. The uterus, for instance, should not be lifted up so high that the round and broad ligaments are tense, for they will constantly be attempting to pull the organ away from its new attachments. The operator must also give due consideration to the function of the uterus and not so operate as to render childbearing impossible. Lastly, he must not disturb the regional anatomy to a degree sufficient to embarrass adjacent organs. As an example, if the uterus be fastened to the abdominal parietes the bladder can never be thoroughly emptied.

Whatever operation is selected should be accompanied or followed by repair of all lacerations of the soft parts.

We will first take the operations which fasten the body of the uterus forward.

*Matthew Mann's Operation* (Fig. 93).—This is an intra-abdominal shortening of the round ligaments. It may be applied whenever the abdomen is opened in the median line for adnexal disease and the uterus is found retroposed and fixed. The ad-



hesions are thoroughly severed and the uterus rendered movable. The outer third of one round ligament is then seized by forceps and drawn inward so as to be folded upon itself. Another forceps grasps the middle third of the ligament and draws it outward, making a second loop. A needle threaded with chromic tendon

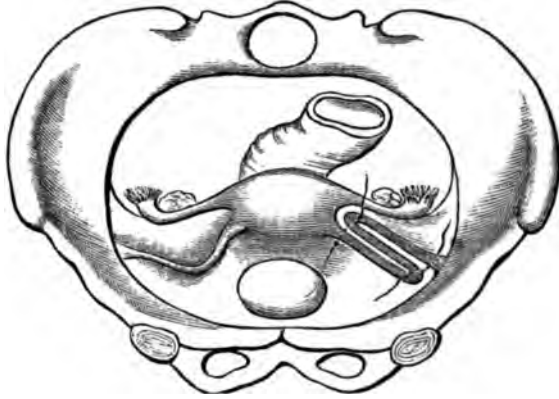


FIG. 93.—MATTHEW MANN'S OPERATION OF INTRA-ABDOMINAL SHORTENING OF THE ROUND LIGAMENTS.

or silk is made to penetrate both limbs of the looped ligament near its angle, and is again passed through the uterine cornu, where the round ligament emerges. This suture is then tied. A second suture is made to fasten the second loop to the ligament as it emerges from the inguinal canal.

The ligament on the opposite side is similarly treated.

The operation does not interfere with pregnancy nor make labour difficult. It is preferable to all other operations upon the round ligaments.

*Ventral Fixation* (Fig. 94).—Hysterorrhaphy or hysteropexy. The operation is done as a step in a laparotomy for diseased adnexa where the uterus is found retroposed. It is also performed as part of the combination of operations applied for the cure of prolapse of the uterus. It is objectionable because it pulls the body of the uterus out of the pelvis into the abdomen. With the uterus, the bladder is displaced upward; and as the points of origin of the round ligaments are raised higher than normal, they as well as the broad ligaments pull down against the point of fixation of the uterus. As a result, the uterus is either stretched

out or the new point of fixation stretches. Fortunately the latter usually occurs. Another disagreeable result of the operation is that it straightens out the utero-sacral ligaments, causing them to come together and constrict the rectum. The operation is very easy. After all sutures for closing the abdominal wound have been passed, two are inserted which penetrate the fascial edges of the wound and pass through the fundus of the uterus just back of the median line. These fixation sutures are about  $\frac{1}{4}$  of an inch



FIG. 94.—VENTRAL FIXATION OF THE UTERUS.

apart, and are preferably of chromic tendon. When they are tied they pull the fundus of the uterus upward and apply its posterior surface to the abdominal peritonæum, where it becomes fixed by plastic effusion. A needle without cutting edges should be used, and the sutures should pass deeply into the uterine musculature. Fortunately for the patients subjected to this operation, the uterus does not long remain fixed, but merely suspended by either a thin sheet of adhesions or by bands running from the abdominal perito-

næum to the posterior aspect of the fundus. The operation has been found to have little effect upon pregnancy, but undoubtedly conduces to faulty presentations of the foetus and to dystocia.

In certain cases in which the uterus had sunk low in the pelvis, and the broad ligaments and vagina had lost their elasticity so that it was impossible for me to lift the body of the uterus up to the abdominal wall, I have performed the operation which is described as *hystercystorrhaphy*, or attachment of the uterus to the bladder. It has always succeeded perfectly. The point where the bladder is attached to the pubis is picked up, and upon drawing it tense is found to be firmly fastened to the pubic bone. Through this a stout chromic-tendon suture is passed, taking a firm grasp of the bladder wall as well as of the peritonæum. This

suture is then made to pass through the anterior face of the uterus at a point opposite the origin of the round ligaments. Three other sutures are passed at  $\frac{1}{4}$ -inch intervals through the peritonæum of the bladder and anterior face of the uterus. The surfaces of the bladder and uterus which will be in apposition are then lightly scraped with the scalpel. Upon tying the sutures, the one at the pubis first, the bladder and uterus will be united, and the uterus will be in exaggerated anteversion. The patient wears a self-retaining catheter for a few days after the operation, to keep the bladder empty so that the field of operation may be kept undisturbed. I have not performed the operation upon a woman in whom pregnancy was possible, and would not advise it in young women. Objection has been made to the uterus lying upon the bladder. This is its normal position before puberty, and no inconvenience is caused by it. The operation is far more effective than any intra-abdominal plastic operation which can be applied to cases of complete prolapse in old women.

Surgeons have exhibited much ingenuity in devising operations for maintaining the uterus in a forward position. Most of these have been applied to the fixation of the round ligaments to some point of the uterus or into the abdominal wound, but none of them seems to be superior to the three procedures I have described.

The intra-abdominal operations for retro-displacements are, with rare exceptions, indicated only when the abdomen has been opened for other purposes. They are never to be performed for movable retroversion until all other appropriate procedures have failed. And they should always be accompanied by curettage and such plastic operations upon the cervix and perinæum as may be demanded. It is not wise to merely correct a displacement and leave uncured those conditions upon which its occurrence depends. To do so is but to invite a recurrence of the false position.

*Alexander's Operation.*—This operation is performed for movable, uncomplicated retroversion. The uterus should not be unduly large or heavy. It and its adnexa should be free from inflammatory changes. The uterus is first replaced and retroflexion corrected. Unless plastic operations upon the uterus or pelvic floor are to be done at the same sitting, a pessary or dressings must be used to hold the uterus up while the ligaments are being shortened. The author does not indorse Alexander's operation, inas-

much as he never fails to cure by other simpler methods the cases for which it is advised. The operation has two disagreeable sequelæ: hydrocele of the ligament and inguinal hernia. I have collected 54 cases of hernia resulting from the operation. Curettage and properly performed plastic work will cure uncomplicated retroposition whenever Alexander's operation can, and without its accidents. Pregnancy is not influenced by it.

The patient is prepared as for a laparotomy, the hair follicles about the pubes being carefully painted by tincture of iodine. Upon each side an incision an inch long is made from the spine of the pubis parallel with Poupart's ligament. The first cut proceeds through the skin and fat. The superficial fascia is then incised and the operator comes down upon the tendon of the internal oblique. He now feels for the external ring and so adjusts the



FIG. 95.—ALEXANDER'S OPERATION.

1, aponeurosis of the external oblique muscle;  
2, the same; 3, internal oblique muscle;  
4, the round ligament near its insertion  
into the pubic fat.



FIG. 96.—ALEXANDER'S OPERATION.

The internal oblique muscle is held upward to expose the round ligament.  
5, the pubic spine.

retractors that he exposes it. It is usually necessary to sever a few covering fibres of fascia which lie over the ring, when the ligament and some fat come into view. The ligament is recognised by being round and pinkish. It is either seized by toothed forceps or lifted by a blunt hook. All nerve fibres are to be



pushed aside by blunt dissection and the ligament grasped between the finger and thumb. The ligament is pulled out 3 or 4 inches, or until a resistance is felt. If its peritoneal sheath appears, it is stripped back with the fingers. A suture of chromic tendon or silver wire is passed through the skin and fascia of one pillar, then through the ligament, to emerge through the fascia and skin of the other side. The ligament is cut off and another suture is

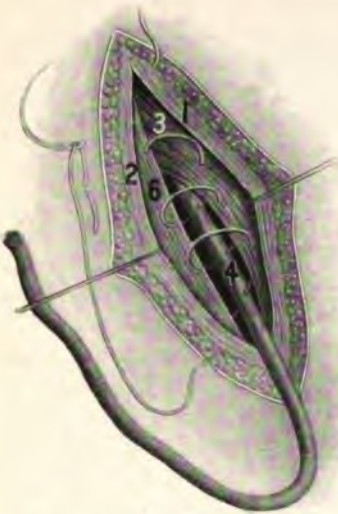


FIG. 97.—ALEXANDER'S OPERATION.

Tenacula are holding the fascial edges apart. Shows the method of passing the suture. 1, aponeurosis of external oblique muscle; 2, the same; 3, internal oblique muscle; 4, round ligament; 6, Poupart's ligament.

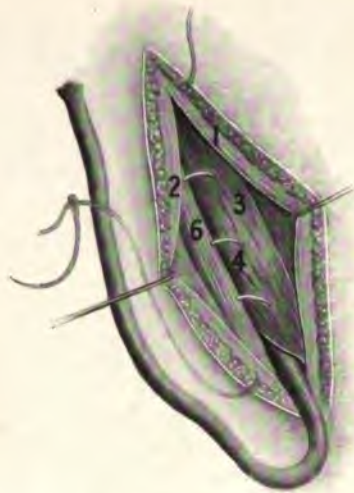


FIG. 98.—ALEXANDER'S OPERATION.

Shows the effect of drawing the suture taut.

inserted to close the wound, which may be made to pass through the stump of the

ligament. The wounds are dressed by iodoform gauze and cotton. If silver wire is used it is removed in two weeks. Chromic-tendon suture does not have to be removed. This is the simplest method of operating, but the ligament is not often so easily secured. The following is the usual procedure adopted: The incision extends for 2 inches from the pubic spine parallel to Poupart's ligament, and the aponeurosis of the external oblique is exposed (Fig. 95). A grooved director is in-

serted beneath this, and it is split nearly to the internal ring and along the fibres of the external oblique. The internal oblique is seen crossing the upper part of the canal, and beneath it the ligament may be seen (Fig. 96). It can always be found by retracting the internal oblique and hooking up the contents of the canal. The ileo-inguinal nerve lies along the outer side of the ligament. This latter is drawn out of the canal, and its investing



FIG. 99.—ALEXANDER'S OPERATION.

Showing the manner in which the suture unites the fibres of the external oblique aponeurosis. 1 and 2, external oblique aponeurosis; 4, stump of the round ligament.

peritonæum is stripped back as it appears. When the ligament has been pulled out about 3 inches, or until tension is felt, the first suture is passed. But one deep suture is used. It pierces the aponeurosis of the external oblique at the inner upper angle of the wound, then the internal oblique and transversalis muscles, the margins of the internal ring, the round ligament, and Poupart's ligament. A third inch lower down the next loop pierces the internal oblique, transversalis, round ligament, and Poupart's ligament (Fig. 97). The last loop takes in the outer pillar of the external ring and comes out upon the aponeurosis of the external oblique. The same suture pierces the internal pillar of the external ring, the round ligament, and external pillar. The round ligament is now cut off close to the last loop of the

suture. The suture is then carried upward, uniting the fibres of the external oblique aponeurosis, and is tied to the other end of the suture (Fig. 99). This deep suture is of medium-sized chromic tendon. The skin is closed by a subcuticular suture of silver wire. The several steps of the operation should proceed upon both sides as nearly simultaneously as possible to avoid undue tension upon one ligament. If a plastic operation upon the cervix is necessary it should be done before the ligaments are shortened, and if the perinæum needs repair this is to be done after shortening the ligaments,

*The author's operation* (Fig. 100) is employed to correct adherent retropositions. The patient is prepared locally and generally, as for vaginal hysterectomy. The uterus is curetted, and any necessary plastic operation upon the cervix is now performed. The posterior *cul-de-sac* is then opened and a careful digital examination is made. Should pus be found, all further attempts at replacement are abandoned, and the case is treated as one of pelvic supuration. But if the pelvic contents are seen to admit of conserva-



FIG. 100.—THE AUTHOR'S OPERATION FOR ADHERENT RETROPOSITIONS.  
Sagittal mesial section of the field of operation to show the corrected position of the uterus and retaining dressings.

tism, the adhesions are severed and appropriate treatment applied to the ovaries and tubes. The pelvis is then wiped dry. A gauze pad (Fig. 101) is introduced into the pelvis and the table lowered into Trendelenburg's position. Into each angle of the incision one chromic-tendon suture is passed. The pad is now removed and the two sutures tied. This will close the vaginal incision except for about  $\frac{1}{2}$  an inch in the centre. Into this opening a wick of gauze is passed so as to reach just above the cut edges. The uterus is then packed,

if necessary. Over this enough strips are placed to fill the incision in the vagina. This gauze plug, together with the uterus, is next replaced. It is easily done, as the patient is lying head down and the intestines have left the pelvis. Holding the uterus in position by means of the trowel or any depressor pushing against the cervix,

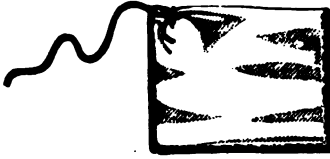


FIG. 101.—GAUZE PAD SECURED BY STOUT LINEN CORD.

Used for the purpose of catching discharges and retaining the viscera during pelvic operations.

pieces of gauze are inserted to the sides of the cervix and in front of it until the vagina is filled to the margin of the levator ani muscle. The operator now takes a stout roll of gauze as thick as his thumb and as long as the width of the distended vagina, usually 2 inches.

This I call my gauze pessary. One end of this is introduced in front of one side of the cervix, just behind the levator ani fibres, and the other end is pushed into a

similar position on the other side. This plug will lie transversely across the vagina and in front of the cervix. It will prevent descent of the cervix even in face of the most violent vomiting. The uterine packing should be so arranged that it can be removed without disturbing this anchoring plug.

A self-retaining catheter is introduced and the bladder is emptied every two hours for two days. The bladder is then irrigated with boric-acid solution and the catheter withdrawn. The uterine packing is now removed without disturbing the vaginal. In seven to ten days the patient is placed in Sims's position. All dressings are removed and replaced exactly as were the first. The operation will fail unless the supporting plug is properly inserted. This is as important as the suture in other operations. The second dressing is applied a week later, is painless, and after it the patient sits up. I keep up these dressings as long as there is any raw surface at the vaginal vault. The supporting tamponade I use for six weeks. I then fit a pessary which is so shaped as to keep the cervix backward by pushing against its anterior lip, and without bearing upon the posterior scar. This instrument should be worn for several months. If perinaorrhaphy is indicated, it should not be performed until the scar posterior to the uterus is thoroughly organized into fibrous tissue. If at any time the dressings are so applied that they allow of descent of the uterus, they



have been improperly inserted. The cervix must be kept high and backward until the *cul-de-sac* opening closes and the post-cervical scar has contracted. The operation leaves the corpus uteri perfectly free. Pregnancy resulting after the operation is uninterrupted and labour is normal. The wick of gauze which is inserted between the edges of the incision lies over the rectum and between the utero-sacral ligaments. Around this gauze lymph forms which attaches the cervix to the rectum and utero-sacral ligaments. The cervix becomes anchored in a high and backward position. Intra-abdominal pressure acting upon the uterus forces the uterine body forward.

The operation in my hands takes the place of all other operations for fixed retropositions. It has a wider range of application than any other procedure, and can be used in all cases not presenting pus. When the retroposition is accompanied by occluded tubes, by hydrosalpinx, by cystic ovaries, etc., this is the preferable operation. But when pus is present in either ovary or tube, removal of this and replacement of the uterus can only be accomplished by laparotomy.

## CHAPTER XII

### *PREPARATION OF PATIENT FOR CAPITAL OPERATIONS*

It is important that the kidneys be led to the elimination of not only a normal quantity of urine, but that they be prepared to withstand the tax which will be placed upon them by the operation. If they be structurally diseased, it is of prime importance to know the degree of the changes. It is through the kidneys that the products of disturbed metabolism are eliminated, and not only the smoothness of convalescence but also the result of the operation will depend much upon the activity of the kidneys. The first effect of an operation is to cause the excessive formation of urea, and in certain cases of toxalbumins. The more dilute the urine the greater the facility with which these are eliminated. Furthermore, the physical comfort of the patient is much improved if the kidneys be active after the operation. It is my practice to administer large quantities of water for several days before I operate, for the purpose of increasing the amount of urine excreted and to reduce the specific gravity of the urine to about 1.010, or even less. At the same time the ingestion of water before operation lessens the post-operative thirst. There are certain hours after a laparotomy during which it is undesirable to give fluids, owing to the irritability of the stomach, and during these the system loses fluid through the activity of the skin and kidneys. Therefore a surplusage of fluid in the system provides against this loss. This surcharging of the body with water is accomplished by the patient drinking from two to four pints of water each day for two days before the operation, and by the administration of enemata of normal salt solution in quart quantities every twelve hours, and with the patient in the knee-chest posture. Of course these statements apply only to cases in which an elective operation is to be performed. There may also be con-

tra-indications in certain diseases, such, for instance, as where a tubo-rectal fistula is suspected, to giving the enemata.

The bowel function is not to be neglected. Women are habitually costive. It is well to give a calomel purge five days before operation, the bowels being kept regular afterward by aromatic cascara sagrada. Intra-abdominal operations, and all operations which necessitate general narcosis, conduce to intestinal torpor. If an operation be performed while the bowels are loaded with fæces, putrefaction of the fæcal matter results, the patient suffers from "retention toxicosis," the abdomen becomes tympanitic, the stomach deranged, and not only is the post-operative discomfort much augmented, but the danger to the patient is actually increased, as well as the success of the operation jeopardized. These remarks apply with particular force when it is intended to perform surgical operations upon the intestines themselves. And if the patient be tympanitic in spite of the free evacuation of the bowels, it is well to overcome this by withdrawing all the gas-producing vegetables and by the administration of salol for three days preceding the operation.

Too little attention is paid to the correction of digestive disturbances before operation and a careful estimation of all the physical elements which influence convalescence. I have but alluded to the two most important factors. The administration of strychnine and other heart tonics are indicated, and if the patient is used to alcoholic stimulants, I give wine at two meals. There is no objection to a substantial diet for four days preceding an operation, all preserved foods and shell-fish being excluded. The day before the operation the diet is liquid, consisting chiefly of the expressed juice of broiled steak and chicken broth.

**Abdominal Section.**—The pubis and vulva are shaved two days before the operation. A poultice of strong soap-suds is applied over the abdomen from the breast-line to the pubic bone and left on twelve hours. It is then removed, the soap washed off, and a thick dressing of gauze wet in mercuric bichloride solution (1 to 5,000) is put on in its stead. It is covered by rubber tissue and held in place by adhesive straps. This is renewed once in twelve hours. When the patient is placed on the operating-table the abdomen is scrubbed by lysol solution (1 per cent) and then by bichloride (1 to 5,000). The skin is then dried and the line of incision as well as the umbilicus is painted by tincture of iodine.

This powerful diffusible antiseptic penetrates every hair follicle. Examination of epithelial scales after this method of cleansing the abdomen shows that the skin is sterile.

The abdominal cavity may be entered in the median line, in the linea semilunaris, or by a crescentic incision above the pubis.

*Median Abdominal Section* (Fig. 102).—If the incision extends from a point  $1\frac{1}{2}$  inch above the pubic cartilage to a little

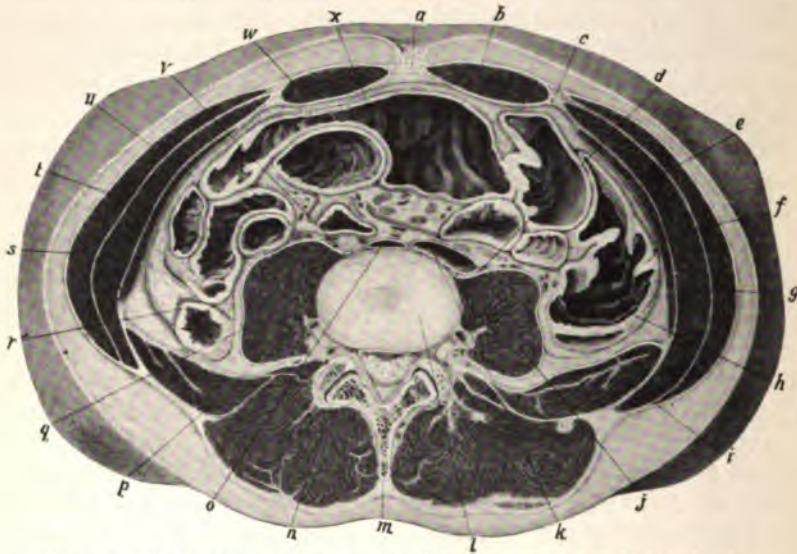


FIG. 102.—TRANSVERSE SECTION OF THE FROZEN BODY AT THE LEVEL OF THE UMBILICUS. (Braude.)

a, umbilicus; w and b, rectus muscle; u and c, great omentum; v and d, ureter; e, transversalis muscle; t and f, internal oblique muscle; g and s, external oblique muscle; h, ascending colon; p and i, quadratus lumborum muscle; j and q, psaos muscle; k, inferior vena cava; l, cartilages of third and fourth lumbar vertebrae; m, spinous process of fourth lumbar vertebra; n, process of third lumbar vertebra; o, descending aorta; r, descending colon; x, transverse colon. a, at the linea alba; c, at the semilunar line.

below the umbilicus, the following structures are severed: the skin, the subcutaneous fat, the deep fascia, the linea alba, the subperitoneal fat, and the peritonæum. If the incision passes to one side of the median line it proceeds through the following anatomical layers: the skin, the fat, the anterior lamella of the rectus fascia, the rectus muscle, the posterior lamella of the rectus fascia, the subperitoneal fat, and the peritonæum. In nulliparæ the linea alba is narrow and is easily missed in the incision,



while in multiparæ it is stretched and is broader. If the incision extends down to the pubis, as I always make it, it passes through the juxtaposed pyramidalis muscles beneath the linea alba. In women who have had children and when the bladder is drawn up by tumours, this part of the incision does not pass through the peritonæum, but enters the retropubic or prevesical space. It is therefore at this point that the incision in suprapubic cystotomy is made. If the median incision is to pass above the umbilicus, this depression is excised, otherwise union will be jeopardized and an asymmetrical scar produced. In excising the umbilicus the adjacent portions of the linea alba will be removed and the two recti muscles exposed with their two lamellæ of fascia. Above the umbilicus the incision will pass through skin, fat, fascia, subperitoneal fat, and peritonæum. A few veins of minor importance are severed in the incision. At a point about  $1\frac{1}{2}$  inch above the pubis a branch of the superficial epigastric artery may be cut just beneath the fat. Beneath the fascia very minute branches of the deep epigastric arteries are severed as they cross the median line to anastomose with those on the opposite side.

The *operation* proceeds in the following manner: the operator stands at the patient's right. With the separated index finger and thumb of the left hand the skin is drawn up and tightened. The belly of the scalpel is drawn downward with force enough to penetrate the skin. The left thumb and index finger separate the edges of the wound and the scalpel is drawn through the fat down to the fascia. All bleeding veins are grasped by artery forceps, and any spouting artery is ligated. An assistant holds apart the fat edges and the operator incises the fascia very carefully. If he has struck the linea alba he will now come down upon subperitoneal fat. If he sees muscular tissue he knows he has passed through the outer lamella of the rectus fascia and has exposed the rectus. It is therefore advisable to make the fascial incision short at first until the exact situation is determined, for if the rectus is exposed, the operator makes another incision nearer the median line so as to strike the linea alba, unless he wishes to pass through the rectus. Upon reaching the subperitoneal fat it will usually be forced up between the lips of the wound. It is covered by a very thin layer of fascia, which is incised so that the operator can introduce two fingers, with which he tears the fat apart along

the whole length of the incision. Beneath this is the peritonæum. Assistants hold apart the severed tissues, using for this purpose Jackson's retractors. The operator picks up a fold of peritonæum with toothed forceps and an assistant does likewise opposite him. The resultant ridge of peritonæum is carefully nicked. The operator introduces one or two fingers along which he incises the peritonæum, using blunt-pointed scissors for this purpose. When the peritonæum is first exposed careful inspection will show two longitudinal bands of dense fibrous tissue running upon each side of the median line. These are the remains of the umbilical arteries. Very rarely they contain a minute arteriole, and therefore the peritonæum should be incised between them. Upon entering the abdominal cavity, the omentum commonly, the small gut often, protrudes through the incision. If either happens the escaped organ should at once be returned and a gauze pad introduced to retain it. At first the incision is made only long enough to permit of the introduction of two examining fingers. If the operation is to continue farther, the incision is to be carried down to the pubis. By separating the pyramidales and recti at this point the maximum separation of the edges of the incision is secured. Furthermore, the nearer the incision to the pubic bone the less the danger of subsequent hernia. The operation completed, the incision is to be closed. I attach much importance to the prompt closure of the peritoneal edges by a running suture of very fine tendon or gut. Within a short time (less than two hours) the union is complete, and adhesion of the intestine to the peritoneal incision is less likely. Interrupted sutures, about  $\frac{1}{2}$  an inch apart, are passed through the fascia. These are of chromic tendons, and in thickness  $\frac{1}{8}$  of an inch. The skin and fat are approximated by a subcuticular suture of No. 27 silver wire or by 1 strand of boiled silkworm gut. To do this the needle is entered above and to one side of the upper limit of the incision and passed through the skin (Fig. 103). It comes out on the cut face of the fat, is made to take a firm hold of the opposite derma beneath the epidermis, is crossed to the other side and made to catch the derma there, and in this way proceeding down the incision the operator finally plunges the needle through the fat and skin below and to one side of the lower limit of the incision. THE NEEDLE SHOULD EMERGE UPON THE SIDE OPPOSITE FROM THE POINT OF ITS INTRODUCTION. As the wire is drawn

taut a very pretty approximation of the skin edges is secured. The ends of the suture are clamped by split shot, or rolled over a piece of gauze. The edge of the incision is covered by sterile gauze, which is secured by zinc-oxide plaster strips. Instead of applying the sterile gauze along the incision, I very often cover the cut with many layers of silver foil. This in oxidizing acts as a protection against infection. The foil is kept in place by cotton and plaster. This is the preferable method of closing the incision. But if a long incision has been made, thus weakening for a distance the abdominal wall, or if the operation has been prolonged, or if for any reason the operator fears vomiting, struggling, or coughing after the operation, a more secure procedure may be applied. The interrupted fascial sutures are passed and tied at inch intervals. A carrying thread is introduced close to the skin edge at the upper limit of the wound, and is made to pass through skin, fat, and fascia. It should enter the fascia midway between the tendon sutures. Upon the opposite side the needle passes upward through fascia, fat, and skin. This procedure is carried out throughout the length of the wound. The carrying threads are used to pull through interrupted sutures of No. 27 silver wire. In this method of suturing the silver wire is made to supplement the absorbable suture, and a secure and nice approximation of all the anatomical layers is obtained. The silver wires are twisted many times. Silver wire should not be used as a subcuticular suture if the incision be over 3 inches in length, because it clings to the tissues and its removal is difficult. Thus, in all incisions over 3 inches, if the subcuticular suture is employed it should be of silkworm gut.

The ends of the wires are left long and folded over a strip of mild iodoform gauze. Another strip of iodoform gauze is then laid alongside the wound opposite the first. Over the whole sterile gauze is placed, to be retained by plaster. The wires are removed

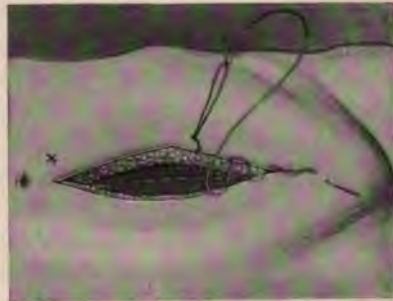


FIG. 103.—THE APPLICATION OF THE SUBCUTICULAR SUTURE WITH SILVER WIRE.

x, point of last emergence of the needle.

in three weeks by cutting their loops on one side. In obese women, when it is hopeless to attempt primary union between the thick fat walls, it is advisable to close the essential layers in the following manner: carrying threads are drawn as interrupted sutures through fascia, muscle, and peritonæum. Then these are made to draw through silver wire of size No. 26. These wire sutures are twisted and the ends left long. No attempt is made to close the skin and fat, but the wound is filled by mild iodoform gauze upon each side of the wires. The dressings are renewed once every four days, and the silver-wire sutures are removed in two weeks. A wound 5 inches in depth will close in seven weeks. Granulations do not appear if the wound be kept aseptic, for the cavity closes by the production of histological plasma cells, which spin a tissue similar to that from which they spring—namely, connective tissue. It is impossible to lay down hard-and-fast rules for the application of the various methods of suturing, but, as a general rule, if the fat wall be about  $\frac{1}{2}$  an inch in thickness, the preferable method is interrupted absorbable sutures through fascia, muscle, and peritonæum, and interrupted silver-wire sutures through skin, fat, and fascia, these latter, as they pass through the fascia, being midway between the absorbable sutures; or, when the abdominal fat is above 1 inch and not over  $2\frac{1}{2}$  inches in thickness, the fascia, muscle, and peritonæum are approximated by stout interrupted sutures of absorbable material, and the fat and skin by a continuous subcuticular suture of silver wire. When the belly fat is over 3 inches in thickness it is better to leave it open; or, if it is closed, it should be by the second method, and between the silver-wire sutures filaments of iodoform gauze should be introduced down to the fascia to drain away the oil which always oozes from such fat surfaces.

*The Lateral Incision.*—This is the incision of Langenbeck through the semilunar line (Fig. 102).

It is employed chiefly in nephro-ureterectomy, but in certain cases of ascending infection upon the right side it affords the operator an opportunity to inspect and treat the adnexa, the vermiform appendix, the kidney, and the gall-bladder. It can be made to extend from the ribs to Poupart's ligament, but is usually made from a point  $\frac{1}{2}$  an inch above Poupart's ligament to 3 inches higher up. The incision should pass just external to the rectus muscle, and in its course severs the skin, fat, external



oblique fascia, internal oblique fascia, transversalis fascia, subperitoneal fat, and peritonæum.

As each of these layers is severed it is held apart by an assistant, who uses for this purpose toothed retractors until the transversalis fascia appears, after which only blunt retractors are employed lest the teeth of the sharper instruments wound the intestines. In closing such an incision there should be 3 distinct layers of sutures. The deepest, of absorbable material, are interrupted, and approximate the peritonæum and transversalis fascia; the second, of absorbable material, are interrupted, and bring together the fascias of the internal and external obliques, while the skin is united by a subcuticular suture of silver wire. In no instance should all the fascial planes be united by one set of sutures, for the direction of effort of the various abdominal muscles attached to these are somewhat antagonistic.

The vessels cut in the operation are the external branches of the deep epigastric artery. If the incision is carried down too far and close to the external ring of the inguinal canal there is danger of wounding the deep circumflex iliac artery.

*The Curved Transverse Incision.*—This is employed in extensive extraperitoneal operations upon the bladder, and for the purpose of performing transperitoneal operations upon the pelvic viscera. A curved incision is made from one external inguinal ring to the other, the cut extending through skin and fat only. The concavity of the incision is upward, and its centre just misses the pubic symphysis. The fat is held apart and the rectus fascia is divided transversely. As the muscles appear, the fascia is dissected upward from the muscles and the fascial flap is turned upward. The recti and pyramidales are then torn apart by blunt dissection in a vertical direction, but the subperitoneal fat and peritonæum are cut through. Care must be taken not to wound the bladder. This incision will open the prevesical space, as well as the peritoneal cavity, the latter for a short distance. During the operation the bladder should be kept empty by means of an open, self-retaining catheter. In closing the incision the peritonæum should be united by a continuous suture of absorbable material, and the pyramidales and recti by interrupted sutures. The fascia of the recti is united by interrupted sutures of absorbable material and the fat and skin closed by a subcuticular suture. The resulting scar becomes largely covered by pubic hair. As the

incision is of limited length, large growths cannot be removed through it. The above procedure is that of Hartmann, of Paris, and is preferable to all of its kinds.

**Vaginal Section.**—The pubis and vulva should be shaved two days before the operation. Unless there is a profuse flow of pus from the uterus, or the operation is done in an emergency, I pack the vagina full of sterile gauze ringing wet in bichloride-of-mercury solution (1 to 5,000) for two days, renewing it each day. This will cause exfoliation of



FIG. 104.—BRUSH FOR SCRUBBING THE VAGINA.

It is imported and should have no back. If it has it will come apart when boiled. It is sterilized by boiling ten minutes in plain water, after which it soaks one hour in 2 per cent lysol.

the superficial layers of vaginal epithelium and sterilize the field of operation. If the purulent leucorrhœa is so profuse as to dam up in case the vagina be packed, the vagina may be irrigated every twelve hours with large quantities of bichloride solution (1 to 5,000). At the time of operating, the buttocks, vulva, and vagina are scrubbed first with a  $\frac{1}{2}$ -per-cent solution of lysol and then with bichloride solution (1 to 5,000).

The pelvic cavity may be entered by an incision posterior to the uterus or by one anterior to it (Fig. 105).

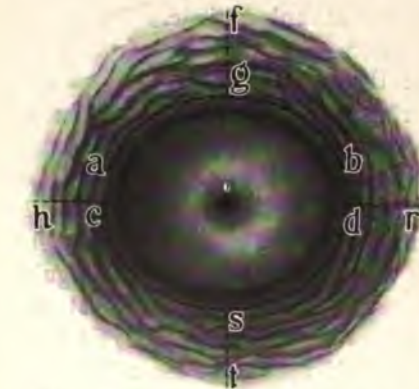


FIG. 105.—THE VARIOUS INCISIONS IN THE VAGINA EMPLOYED TO ENTER THE PELVIS FOR PURPOSES OF REMOVING GROWTHS, EVACUATING FLUIDS, EXPLORING THE PELVIC CONTENTS, REMOVING THE UTERUS, AND DOING OPERATIONS UPON THE ADNEXA.

*c, s, d*, the line of incision employed in posterior incision; *s, t*, Henrotin's incision to enlarge the latter; *h, e* and *d, r*, Ségond's incision to enlarge *c, s, d*; *a, g, b*, this with *c, s, d*, are the incisions employed in vaginal hysterectomy; *a, g, b* with *f, g* are the incisions used in anterior incision.

**The Posterior Incision.**—The bar to a thorough inspection of the pelvic cavity through the vagina is the uterus, and a great embarrassment experienced in the procedure is prolapse of the intestines into the vagina. If a posture can be secured which will

prevent the latter, and an incision adopted which will remove the uterus out of the way without injuring it, vaginal exploration of the pelvis will supersede the abdominal. The author believes that his procedure secures both the desirable factors essential to success.

It must be remembered that the distance from the vulva to the *cul-de-sac* is even less than from the abdomen to the *cul-de-sac*.



FIG. 106.—As the CERVIX is moved up by the FORCEPS which holds it, a CRESCENTIC FOLD is seen OVER THE POINT OF REFLECTION OF THE PERITONEUM FROM THE CERVIX.

Therefore, the cavity explored from below is not as deep as when sought from above. The ability to see the pelvic structures through the vagina is then dependent upon the space secured. The space is not so much limited by the vulva as by the condition of the tissues about the cervix. If the vaginal incision posterior

to the cervix is  $1\frac{1}{2}$  inch from side to side, the elastic tissue will yield under the pressure of the retractors to make the opening at least  $1\frac{1}{2}$  inch wide by over 2 inches antero-posteriorly. But in the rare cases of pronounced sclerosis the elasticity of the vaginal vault may be found so limited that sufficient space cannot be secured



FIG. 107.—THE INCISION POSTERIOR TO THE CERVIX; THE LATTER HELD BY A BULLET FORCEPS.

through which to make an adequate visual inspection. The operator will then have to depend almost wholly upon his sense of touch.

*Operation.*—The patient is placed upon the table in the lithotomy posture, with the ischial tuberosities over the edge of the table. The perinæum is retracted by a short Jackson speculum and the uterus is pulled down. The uterus is curetted and swabbed out, but not packed with gauze. The vagina is wiped dry. Upon shoving the cervix upward a fold will be seen to



form just opposite the cervico-vaginal junction. The vagina is incised here, scissors being used for the purpose. The scissors cut through vaginal mucous membrane only. The incision is commonly 1 inch long and extends to the lateral borders of the cervix (Fig. 105). There now remains but one tissue to sever—the peritonæum. The uterus is held firmly down and the operator pushes his index finger into the *cul-de-sac*. In doing this he is careful to keep the point of his finger accurately in the middle line and pressed up against the posterior uterine wall. If after pushing the tissues up to the level of the internal os the finger has not entered the peritoneal cavity, the point of the finger is directed backward and pushed into the cavity. If the peritonæum is very thick it is caught with toothed forceps and incised with scissors. Commonly serum escapes when the cavity is entered.

In making the incision one small vessel is severed—the azygos artery of the vagina.

It requires forcipressure very rarely, being an insignificant vessel. Having entered the pelvic cavity, a gauze pad, to which a string is attached, is introduced into the pelvis. While the operator washes his hands, an assistant lowers the table into the Trendelenburg position (Fig. 4). At once all unattached viscera leave the pelvis. The operator now inserts his two index fingers into the rent, and upon separating his hands the incision is spread laterally. This tear takes place in the line of the incision. A careful digital examination is now made of the pelvic contents. The finger glides up along the smooth posterior uterine wall as high as the fundus and is then swept laterally over one cornu and tube. The ovary and tube upon one side are carefully palpated. If tender adhesions are met with they are torn with the finger. Unless pus is suspected, the effort is made to free the ovary and tube from adventitious union. The operator remembers that his finger has entered below the plane of the bases of the broad ligaments, and that his manipulations are behind the broad ligaments upon their posterior surfaces.

At once this will indicate to him the method of separating adherent adnexa. In doing this the finger is moved between the surfaces of union from the side of the uterus upward and outward, a sort of lifting motion being made. All the time the adnexa are being manipulated the uterus is firmly held down with the bullet forceps. The pelvis is now wiped free from blood. If

firmly adherent adnexa or cystic accumulations are met with, it is better not to complete their separation before inspecting them. Inspection of the pelvis is next made. A medium Péan retractor is introduced, and the perinaeum, vagina, and posterior edge of the incision are held down by it. The cervix is loosed from the grasp of the bullet forceps, and a Péan-Pryor trowel is inserted behind the uterus. The soiled pad is now removed, and several clean ones are inserted. The uterus is pushed up behind the symphysis and out of the pelvic cavity by the trowel. This is the very essence of the procedure, for by it the obstructing uterus is lifted out of the way. By dexterous manipulation of the trowel the adnexa of first one side and then the other are exposed to view. When seen they may be grasped with ovary forceps and brought down into the vagina, where they may as readily be operated upon as is the cervix in plastic work.

If the thickening about the cervix is so dense as to render the tissues inelastic, an increase in space may be secured by making a cut through the centre of the posterior vaginal wall down to a point opposite the bottom of the *cul-de-sac* (Fig. 105, *s, t*).

Having done such work upon the uterus, pelvic peritonæum, or adnexa uteri as is indicated, the pelvis is wiped dry and the gauze pads removed. Another small pad is introduced and the sutures for closing the incision passed. The peritonæum at one angle is caught up with bullet forceps and drawn out. A stout curved needle is then passed through the four layers and held by an assistant (Fig. 108). The angle of the other side is similarly treated, and other sutures passed between the two at the angles at  $\frac{1}{2}$ -inch distances sufficient to secure a good approximation. The gauze pad is then removed and the sutures tied. A light vaginal pack of iodoform gauze is placed over the incision; or the incision may be left either wholly open or partially closed for gauze drains. I prefer small chromic kangaroo tendons as suture material.

*Anterior Incision.*—The bladder is emptied and the perinaeum retracted by means of Jackson's speculum. The uterus is pulled down after curettage and a circular incision is made anterior to the cervix and through the vaginal mucosa only (Fig. 105). From the centre of this another incision passes down the anterior vaginal wall as far as desired, even to the urethral mound. The lateral flaps are then separated and the bladder, by blunt dissection

with the finger, is freed from the uterus. As the vesico-uterine fold of peritonæum is felt the bladder is held up by the narrow trowel. When the peritonæum is exposed it is caught by toothed forceps and cut transversely.

If it is desired to draw down the body of the uterus, a blunt needle threaded with heavy silk is passed deeply into the anterior face of the uterus and the thread used for traction purposes. If it is wished, the round ligaments may be drawn into the wound and each folded upon itself, thus shortening them. The sutures doing this are then passed one upon each side through the middle of the vaginal flap and tied. The traction string is cut and withdrawn, and the peritonæum closed by suture. At this stage small vessels which have been severed in the cervico-vesical attachment are sought and secured. The wound is now closed. Chromic-tendon sutures are employed throughout. The vagina is packed with iodoform gauze. The patient keeps in bed for two weeks.



FIG. 108.—SHOWING METHOD OF CLOSING THE POSTERIOR VAGINAL INCISION.

Through such an incision as this the various *conservative operations* may be performed upon the adnexa, fibroids in the anterior wall of the uterus removed, or small ovarian cystomata removed. The operation has the disadvantage of proceeding anterior to the broad ligaments, whereas the adnexa lie behind these, and the greater additional disadvantage in that it furnishes no drainage at the lowest pouch of the peritonæum. It has but a limited application. The trauma inflicted by it is as great as that accompanying laparotomy, and the author does not employ the operation except to remove fibromata from the anterior wall of the uterus.

## CHAPTER XIII

### *MYOMECTOMY*

**Abdominal.**—*Indications.*—Enucleation of a uterine myo-fibroma through an abdominal incision is indicated when the patient is young or very desirous of bearing a child; when the tumour is pedunculate, or sessile even, provided the trauma inflicted upon the uterus will not impair its function or subject the patient to a risk much greater than would follow a more radical operation; particularly when there is reason to believe but one tumour is present; and never unless a precise explanation has been given the patient regarding the value of this operation and of hysterectomy, and the possibility of a repetition of operative procedure owing to the formation of new growths. The mortality attending myomectomy is largely governed by the amount of trauma inflicted upon the uterus. Therefore this operation, when applied to sessile and multiple fibromata, carries with it a risk greater than that attending the removal of a very large pedunculate fibroid. Furthermore, the nearer the growth to be removed is to the large arterial trunks the greater the risk.

The operation is contra-indicated in fibro-cystic tumours; should rarely be done when pus is present about the uterus; never when the pedicle of the tumour is necrotic from torsion; never in retro-peritoneal tumours or in intraligamentous, or in tumours lying hidden between the bladder and cervix. It is a safe rule never to apply this operation to sessile tumours in which the greatest diameter of the growth is attached to the uterus, for the trauma and difficulty in controlling the hæmorrhage are so great as to jeopardize the vitality of the organ.

*Operation.*—The abdomen is opened in the median line. Upon viewing the uterus and tumour, the four cardinal anatomical points of the organ are to be noted (the Fallopian tubes and round liga-



ments), for upon their mutual relations will depend the relation of the tumour to the uterine cavity and the arterial supply. If the tumour is pedunculate a circular incision is made through the peritonæum a little above the insertion of the tumour. The attachment of the tumour to the uterus is then cut away by a cone-shaped incision. After removal of the growth the larger vessels are secured by very fine tendon ligatures and the muscular parts of the pedicle are approximated by interrupted sutures.

The ends of these are cut short, and a running suture closes the peritonæum over the wound in the uterus. In enucleating the pedicle of the growth the uterine cavity must not be entered, and in closing the wound all bleeding must be stopped by the sutures in such a manner as not to produce sloughing by strangulation. The particular danger from the operation lies either in the inability to control the bleeding after the pedicle is severed or in the too snug approximation of the tissues by multiple sutures in the attempt to stop all oozing. The incision of the pedicle should be made parallel with the course of the vessels so as to sever as few as possible, and this will usually be bilaterally. The abdomen is to be closed without drainage.

If the tumour is sessile a linear incision is made through its capsule down to the white fibres of the tumour. The edges of the cut are then held apart and the tumour seized by forceps or fastened by a corkscrew. It is then dug out of its bed by blunt-pointed closed scissors or by a periosteum elevator, all bleeding vessels are secured, and the cavity is closed by tiers of tendon sutures.

**Vaginal.**—*Indications.*—In all retro-peritoneal, intraligamentary, and retrovesical fibro-myomata which do not demand hysterectomy and are not too large to pass the vaginal outlet. It is also applicable to intra-uterine tumours under certain conditions. The operation is contra-indicated in all fibro-cystic growths. The operation is contra-indicated in all cases where the tumour springs from the uterine body at a point higher than the vesico-uterine fold. It will be seen that the indications for this operation contra-indicate abdominal myomectomy, and *vice versa*.

*Operation.*—The uterus is curetted. By means of an appropriate incision the tumour is exposed. In intraligamentary growths by a cut along the base of the broad ligament, in retro-

peritoneal fibroids by incising the vagina posterior to the cervix and peeling the peritonæum off the tumour, and in vesico-uterine tumours by dissecting the bladder from the uterus. So soon as the tumour is exposed it is fixed by means of the corkscrew. This will furnish a firm grip upon the growth, and the operator then proceeds to dissect the tumour from its investing capsule. This is preferably accomplished by using a closed pair of blunt-pointed curved scissors as an enucleator. After the tumour is enucleated the incision is closed except a small space in the centre, which is left open for an iodoform-gauze drain. There are no particular dangers in the operation. In intraligamentous tumours the uterine artery must be carefully felt for and avoided.

*Removal of Intra-uterine Growths.*—The cervix has been previously dilated by means of sterile laminaria tents, or it is instrumentally dilated at the time of operating. The latter is the preferable method. The operation is indicated whenever the tumour can be removed through a cervical canal which has been artificially enlarged. By the exercise of patience very many cases now subjected to hysterectomy can be successfully treated in this manner.

The cervix is dilated as fully as possible by the branched dilators or until the examining finger can be introduced. In these cases the cervical canal is generally patulous and readily dilated. If sufficient dilatation cannot be secured, the cervix may be split bilaterally or even in a stellate manner by means of a blunt bistoury. Guided by the finger, a corkscrew is forced into the tumour. The mucous capsule of the growth is next incised and peeled off the tumour. As soon as the glistening fibres of the tumour are seen, the latter is grasped close to the corkscrew with heavy toothed forceps and rotated, while by means of blunt dissection the growth is dug out of its bed. Or the capsule is first split and then the tumour is fastened by the corkscrew and dissected from its bed below and laterally as far as the operator can reach, and grasped by Sims's fibroid hook, the corkscrew removed, and the growth pulled down; the capsule is then peeled up and another hold secured by another hook. In this manner, alternately rolling down the tumour and peeling up the capsule, it is entirely freed from its bed. Tumours may in this way be loosened even when too large to be pulled through the cervix. They are then seized by the forceps and split in two or

more pieces by a blunt bistoury and removed in fragments. After the tumour is removed, a digital examination of the uterine cavity is made to detect other growths, and the loose flaps of capsule are trimmed away by scissors. The uterus is thoroughly curetted and packed full of 20-per-cent iodoform gauze. This dressing is changed in three days. Any incisions in the cervix are not closed now, but later. **AS THE SOLE DANGER IN THE OPERATION IS FROM SEPSIS, A WIDE-OPEN CERVIX AND THE FREEST DRAINAGE ARE NECESSARY.**

### **ABDOMINAL HYSTERECTOMY FOR FIBROID DISEASE OF THE UTERUS**

*Indications.*—Hysterectomy is the operation of choice in all cases of general fibroid degeneration of the uterus which need operative treatment, while the operations just described are those of election under certain circumstances. The abdominal removal of the fibro-myxomatous uterus is particularly indicated in growths which have reached the umbilicus, and especially in the softer tumours, such as the cystic and angiomatous. Upon discovering a fibroma the propriety of operating at all will depend upon the symptoms the growth produces or which it is known it will produce if let alone. After operative procedure is decided upon the question of myomectomy or hysterectomy comes up; and if the latter, whether by the abdomen or vagina. I have expressed my preference for hysterectomy over myomectomy as a general rule. If these growths occurred singly myomectomy would be the operation of choice, but when I have carefully examined the fibroid uteri I have removed, I have seldom failed to discover multiple, though perhaps very small, nodules in addition to the greater tumour which necessitated this operation. Women with fibroid uteri are notoriously sterile in a percentage far greater than in anteversion even. It is difficult to see how myomectomy can relieve this, and in fact it rarely does. So this form of conservatism is not substantiated by the experience in its application. The argument for hysterectomy based upon the supposition that fibroids become malignant has no foundation in analysis of these growths. Fibroid uteri are more frequently associated with cancer than are uteri not fibroid. But we must not forget that cancer is most prevalent after the age of thirty-five, and it is at this time also that the nidus of a

fibro-myoma usually becomes active. If the operator believes as I do in the multiplicity of fibromata, then he must expect after a myomectomy to have the latent and undiscovered fibroid foci at some future day produce other growths which will demand removal. If this belief is laid before the patient she will usually elect the radical operation or the palliative treatment. The danger of myomectomy is in direct proportion to the amount of injury inflicted upon the uterus during its performance, as, for instance, in multiple fibroids. And if the fibroids are multiple myomectomy is useless, for all the tumours can never be removed in such cases, overlooked foci being always left. As much as one must admire the operative skill of him who has perfected this operation of myomectomy for multiple fibroids, the operation must be always considered as incomplete and as fraught with more danger than accompanies the ablation of the tumour-bearing organ. However, one may remove all growths which are pedunculate and put the patient upon mammary or thyroid extract to produce absorption of the intramural growths in the hope that she may bear children, or in obedience to the very pardonable sentiment which women have against removal of their special organs. A greater experience with improved forms of thyroid extract may establish this as the rule to follow. Hysterectomy should, if possible, be avoided in women under thirty-five years of age, for in them disagreeable psychic symptoms often supervene and genital atrophy is sure to result. It cannot be too often repeated, nor with too great emphasis, THAT FIBROID UTERI ARE NOT TO BE REMOVED UNLESS PRODUCING DISAGREEABLE OR DANGEROUS SYMPTOMS. These are repeated and uncontrolled hæmorrhages, pressure upon nerves or ureters, or bladder or bowels, and rapid growth. Tumours of large size should always be removed, as they undermine the general health. Fibro-cystic and angiomatous tumours, those of rapid growth as well as those which are multiple, should be treated by hysterectomy. Fibro-myomata, accompanied by tubo-ovarian disease so severe as to necessitate removal of the adnexa, always indicate hysterectomy. Likewise infected fibroids and those associated with pelvic suppuration always demand hysterectomy.

*The Operation.*—The vagina should be prepared and cleansed as for a vaginal section, and the abdomen sterilized as for all laparotomies. The abdomen is opened in the median line. The regional relations of the involved organ are determined. A



careful examination of the ovaries is now made, AND UNLESS THESE ARE MANIFESTLY DISEASED THEY ARE NOT TO BE REMOVED. As a rule, one or both must be sacrificed because of interstitial changes, or because so involved in adhesions to the uterus. Abdominal hysterectomy may be performed in several ways.

(a) (Fig. 109). The ovarian arteries are ligated at the pelvic brim. The bladder is next dissected away from the cervix down to the vagina until the uterine arteries can be felt. These are then ligated, a curved aneurysm needle passed around them, carrying the ligatures. The round ligaments are next ligated a little distance away from the uterus. By means of an incision which passes down one side the ovarian vessels are severed, then the round

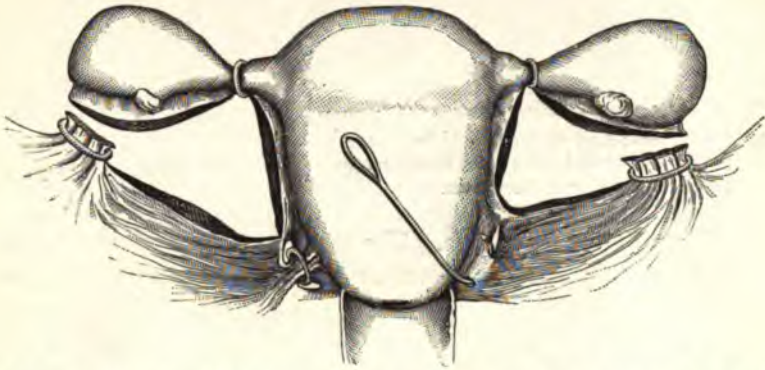


FIG. 109.—SCHEMATIC DRAWING SHOWING THE POSITION OF THE LIGATURES ON THE OVARIAN AND UTERINE ARTERIES, ALSO THE LIGATURES AT THE CORNUA UTERI TO CONTROL THE OVARIAN ARTERIES WHERE THEY ANASTOMOSE WITH THE UTERINES.

See Fig. 119 for the arterial dissection.

ligament and broad ligament, the uterine arteries are cut along-side the cervix, and the vagina is entered. The uterus is then tilted over to the other side. The incision now passes up through the vagina, broad ligament, round ligament, and ovarian vessels. Smaller vessels, such as branches from the vaginal arteries, may require ligatures. By means of this operation the symmetrically enlarged uterus is readily and speedily removed.

(b) If there be an *intraligamentous nodule* upon one side, and usually when the uterus is large, the procedure is different. Here both ovarian vessels are ligated and both round ligaments. The bladder is then separated from the uterus by an incision

passing across the uterus at the cervico-vesical fold, and the bladder is peeled down until the vaginal cervix can be felt through the



FIG. 110.—THE ABDOMEN HAS BEEN OPENED AND THE TUMOUR AND ADNEXA DELIVERED. 1, the umbilicus; 2, gauze pad to hold back the intestines; 3, the left ovary and tube; 4, the right ovary and tube; 5, the fibroid uterus. The operator's hands are uncovered. His assistants wear rubber gloves.

anterior wall of the vagina. The tissues are now carefully cut on the free side: first, the ovarian vessels, then the round liga-

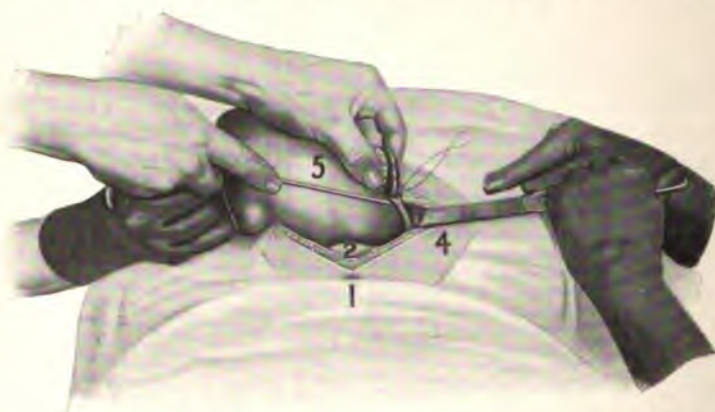


FIG. 111.—THE UTERUS IS DRAWN TO THE LEFT, AND THE SURGEON IS PASSING THE PEDICLE NEEDLE THREADED WITH TENDON LIGATURE BENEATH THE RIGHT OVARIAN VESSELS OUTSIDE THE RIGHT OVARY.

1, the umbilicus; 2, gauze pad holding back the intestines; 4, opposite the top of the right broad ligament which contains the ovarian vessels; 5, the fibroid uterus.

ment, then the broad ligament, until the uterine artery is felt. After severing the top of the broad ligament the uterine artery is best exposed by separating the folds of the broad ligament and shoving them down by blunt dissection with the fingers. The uterine artery is now ligated or clamped and the cervix cut away from the vagina upon this side and anteriorly. The uterus is now forcibly pulled out towards that side upon which the intraligamentary nodule is situated, and the cervix is grasped with

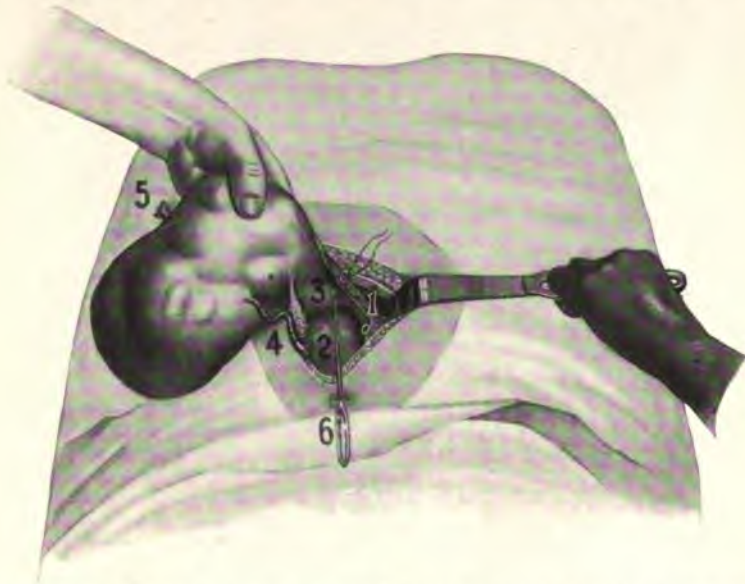


FIG. 112.—THE TOP OF THE RIGHT BROAD LIGAMENT HAS BEEN CUT AND THE TUMOUR IS DRAWN FAR OVER TO THE LEFT. BETWEEN THE FOLDS OF THE RIGHT BROAD LIGAMENT THE CURLED UTERINE ARTERY IS SEEN. BENEATH THIS THE PEDICLE NEEDLE IS PASSING.

1, above the stump of the ovarian artery; 2, the sigmoid colon; 3, placed upon the cervix uteri; 4, the left adnexa; 5, the right Fallopian tube; 6, pedicle needle.

powerful traction forceps and lifted up also. This renders the vagina tense, and by means of scissors the cervix is entirely cut away from the vagina. The base of the broad ligament is opened up and the uterine artery exposed beneath the intraligamentary nodule. The artery is ligated and cut close to the cervix. It is now an easy matter to peel the fibroid nodule from between the layers of the broad ligament. The ovarian vessels and round liga-



ment upon this side are cut, and a few snips with the scissors cut the loose folds of the broad ligament. The uterus is now removed. Although the four cardinal vessels have been secured, lesser arterial trunks as well as veins may need ligatures before all bleeding ceases, particularly in the posterior vaginal wall and utero-sacral ligaments. This is the operation which the author almost invariably performs. Instead of applying ligatures as the operation proceeds, the several vascular stumps may be caught by

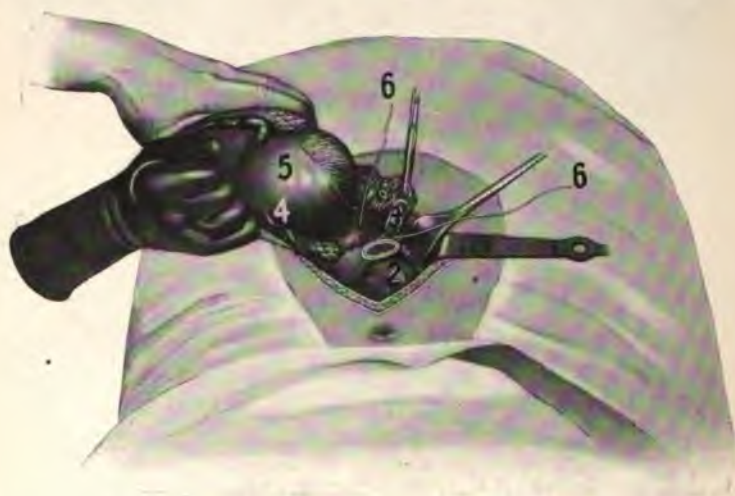


FIG. 113.—THE RIGHT UTERINE ARTERY HAS BEEN TIED AND THE CERVIX CUT LOOSE UPON THE RIGHT SIDE SO AS TO ENTER THE VAGINA. THE CERVIX IS HELD HIGH UP WHILE A LIGATURE IS THROWN AROUND THE LEFT UTERINE ARTERY.

2, on the rectum beneath the vaginal orifice; 3, on the cervix; 4, over the left adnexa; 5, the fibroid uterus; 6, the ligature around the left uterine artery which is plainly seen.

clamps which are afterward replaced by ligatures without the embarrassing presence of the tumour.

(c) If both sides contain intraligamentous nodules the case is most difficult. The ovarian vessels are first secured, then the round ligaments, and the bladder is dissected from the uterus until the vagina can be felt. The anterior face of the uterus is now split so that the uterine cavity is entered throughout its length and the cervix cut open so that the vagina is entered. By means of serrated traction forceps the lips of the incision are held apart. Upon one side the uterine cavity is cut up and down through its





FIG. 114.—THE CERVIX HAS BEEN CUT AWAY UPON THE LEFT SIDE AND THE BASE OF THE LEFT BROAD LIGAMENT SEVERED. THE MASS NOW HANGS BY THE TOP OF THE LEFT BROAD LIGAMENT ONLY, IN WHICH IS THE LEFT OVARIAN ARTERY. AROUND THIS A LIGATURE IS THROWN.

1, right adnexa; 2, rectum; 3, cervix; 4, left adnexa; 5, fibroid uterus; 6, ligature around the left ovarian vessels.

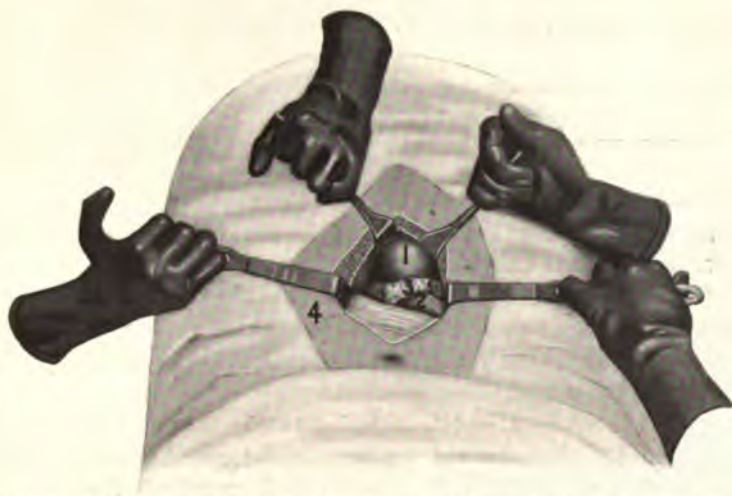


FIG. 115.—THE UTERUS AND ADNEXA HAVE BEEN REMOVED, AND THE VAGINA PACKED WITH GAUZE.

1, bladder; 2, rectum; 3, gauze in vaginal orifice; 4, gauze pad holding back the intestines.

musculature towards the corresponding broad ligament so as to expose one intraligamentary nodule. A corkscrew is worked into this, and it is rapidly dug out of its bed. This half of the uterus at once becomes movable. The next step is to ligate its uterine artery, complete the hemisection of the uterus, and cut away this half of the uterus. Upon the other side the same procedure is carried out. The object of removing the intraligamentary nodules through the severed uterine walls is to produce symmetry upon

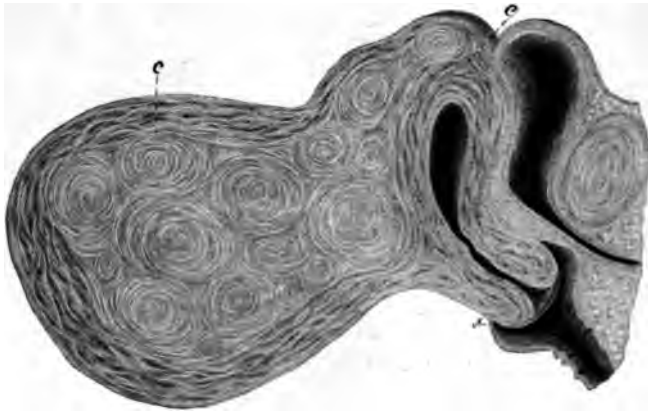


FIG. 116.—SHOWING THE RELATIONS WHEN A LARGE RETRO-PERITONEAL NODULE EXISTS.

The same relations are present when a similar nodule springs from the posterior uterine wall but above the peritoneal reflection as in this case. *c, c,* between these letters the uterus and fibroid capsule must be split before the fibroid can be extracted.

each side of the pelvis successively, thus allowing the ureter, often displaced over the broad ligament, to recede to its usual situation and thus escape injury.

(*d*) If there be a retro-peritoneal nodule the hemisection of the uterus is made until the nodule is exposed (Fig. 116). It is then removed, and the uterus becomes movable and the pelvic anatomy symmetrical.

(*e*) If there be a nodule anterior to the uterus, between the bladder and uterus, the ovarian vessels and round ligaments are first secured, after which the bladder is dissected off the tumour (Fig. 117). The anterior face of the uterus is next split so that the nodule can be removed. The operation is then completed in either the first or second forms described.

*Adhesions* to the viscera are dealt with as described under Ovariectomy. But with fibroid tumours these new attachments are most vascular. If a *pus* ovary or tube is found, it is advisable to remove this before proceeding to the hysterectomy lest the pus sac rupture and soil the spaces opened into beneath the peritonæum. When an *ovarian tumour* coexists with a small fibroid



FIG. 117.—A NODULE SPRINGING FROM THE ANTERIOR UTERINE WALL.

Notice the position of the bladder, drawn out of the pelvis above the pubic bones. *c, c,* between these letters the capsule of the fibroid must be split before the fibroid can be extracted and the uterus rendered movable.

uterus the whole may be removed together; but if the fibroid be large, its removal is facilitated by first taking away the ovarian growth.

If the myoma is complicated by *cancer* of the uterus, the removal of the organ must be of that radical type advised for cancer. Vaginal hysterectomy is not possible because of the large size of the organ, and it must be removed as described under Abdominal Hysterectomy for Cancer of the Uterus.

After the uterus has been removed the pelvis should be wiped dry and each ligature carefully inspected to see if it is holding securely. Several strips of iodoform gauze are then introduced into the vagina, their ends just projecting above the cut edges

of the vagina (Fig. 115). Beginning at one stump of a ligated ovarian artery, a running suture is tied, and by proceeding down the pelvis the peritoneal surfaces are approximated, then across the vaginal opening and up the other side, the suture being tied at the opposite ovarian ligature (Fig. 116). This will close out the field of operation from the general pelvic cavity. The gauze

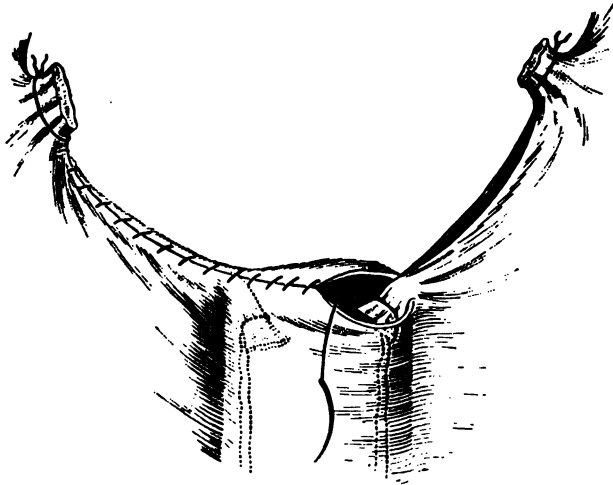


FIG. 118.—SCHEMATIC DRAWING TO SHOW THE METHOD OF CLOSING THE VAGINA OVER THE UTERINE STUMPS, AND THE METHOD OF UNITING THE FOLDS OF THE BROAD LIGAMENTS.

drain is introduced because there is always more or less oozing of bloody serum after the operation. The rectum is adjusted so as to touch the bladder, the omentum drawn down, and the abdomen closed. The vaginal drain is removed in a week and is renewed. Upon its removal in five days no further dressing is needed and the patient is put upon daily douches of boric-acid solution.

It will be observed that removal of the cervix is advised. The reason for this is that the operation is generally simpler than it would be were the cervix left; removal of the cervix allows of perfect drainage, a most desirable thing when infection of the fibroid or of the adnexa exists; to save the cervix in complicated cases renders the operation more difficult, and if the cervix is left it may break down into cancer later, or be the seat of gonorrhœal infection. If an intraligamentous nodule has been removed,



and in all cases of infected fibroid, fibroid with cancer and fibroid with pyosalpinx, the folds of the broad ligaments may be united by a few sutures, but it is advisable to leave the vault of the vagina open for drainage, the vagina being filled with iodoform gauze. In reality, this in a few hours becomes extraperitoneal because the bladder and rectum speedily unite over the gauze.

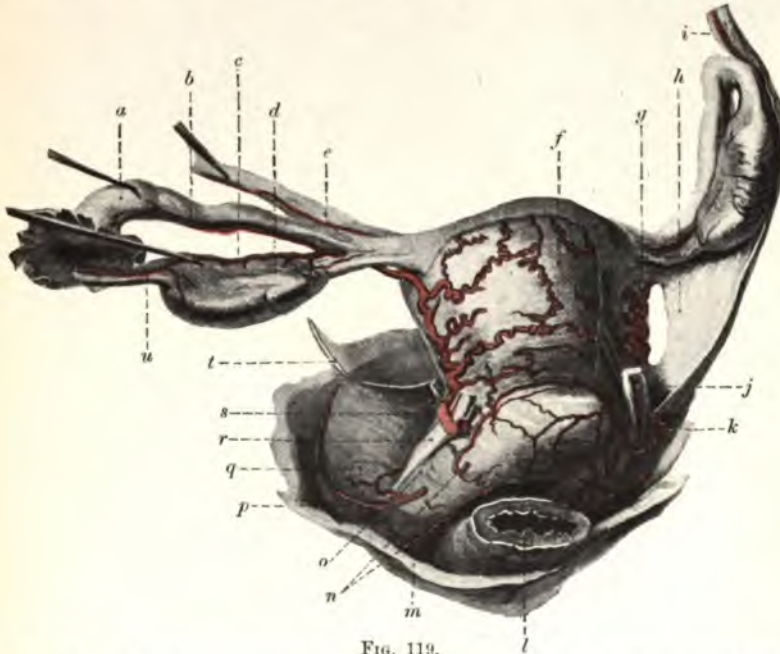


FIG. 119.

a, Fallopian tube; b, artery to the tube; c, artery to the ovary; d, ovary; e, round ligament; f, uterus; g, uterine artery alongside the uterus; h, broad ligament; i, ovarian artery; j, ureter; k, uterine artery as it passes the ureter; l, rectum; m, levator ani muscle; n, branches to the vagina; o, vagina; p, inferior vesical artery; q, bladder; r, ureter; s, uterine artery; t, peritoneum; u, ovarian artery (Spalteholz).

The *mortality* from abdominal hysterectomy for myo-fibroma uteri is not over 2 per cent. But in fibro-cystic tumours the mortality is much higher, reaching at least 10 per cent. This is due to the coexisting cardiac lesions which so often accompany fibro-cystic disease.

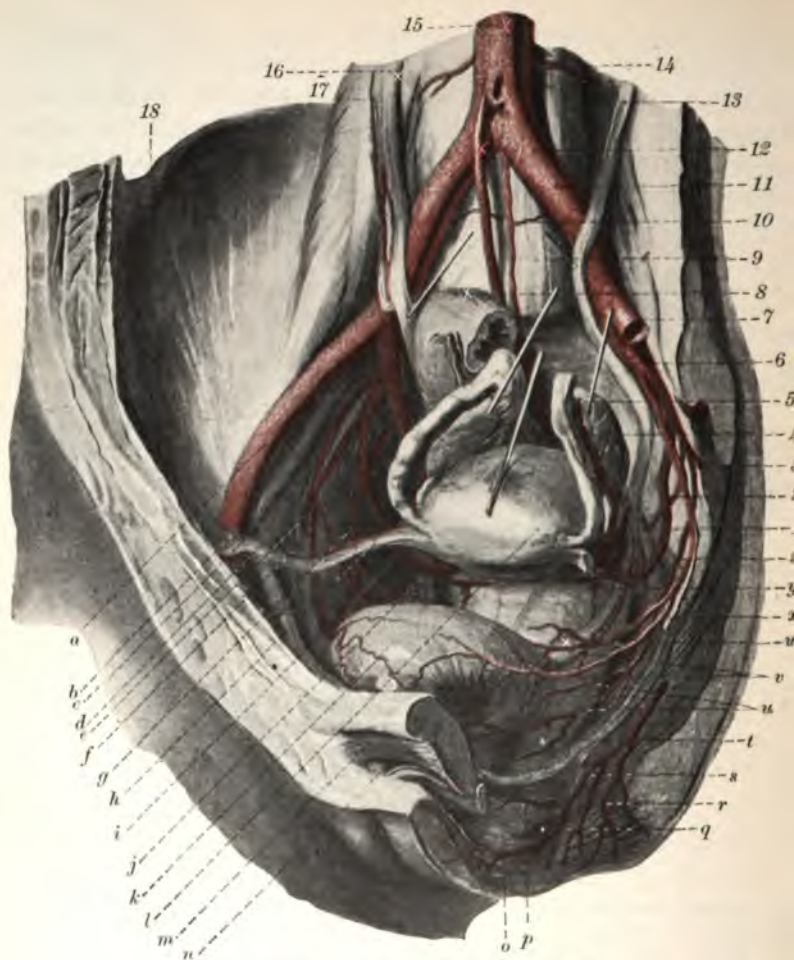


FIG. 120.—ARTERIES OF THE FEMALE PELVIS.

*a*, external iliac artery; *b*, inferior epigastric artery; *c*, obturator artery; *d* and *h*, round ligament; *e*, superior vesical artery; *f*, obliterated hypogastric (umbilical) artery; *g*, inferior vesical artery; *i*, uterine artery; *j*, ureter; *k*, bladder; *l*, uterus; *m*, symphysis; *n*, artery of the clitoris; *o*, posterior labial artery; *p*, artery of the clitoris; *q*, levator ani muscle; *r*, inferior hæmorrhoidal artery; *s*, internal pudic artery; *t*, vagina; *u*, inferior vesical arteries; *v*, superior vesical arteries; *w*, ureter; *x*, obliterated umbilical artery; *y*, vaginal artery; *z*, superior hæmorrhoidal artery; *1*, uterine artery; *2*, vaginal artery; *3*, inferior vesical artery; *4*, ovarian artery; *5*, artery to the Fallopian tube; *6*, internal iliac artery; *7*, external iliac artery; *8*, rectum; *9*, middle sacral artery; *10*, lumbar branch; *11*, common iliac artery; *12*, inferior mesenteric artery; *13*, ureter; *14*, fourth lumbar artery; *15*, aorta; *16*, ureter; *17*, ovarian artery; *18*, iliacus muscle.

VAGINAL ABLATION OF THE FIBROID UTERUS<sup>1</sup>

*Indications.*—The operation is indicated in all cases where there is a not too great disproportion between the growth and the vaginal outlet. In old women with shrunken and rigid tissues it is more difficult than in the younger, whose tissues are elastic. It is particularly indicated in retroperitoneal and intraligamentous tumours. As a rule, growths which do not reach above the umbilicus can be removed in this manner. In fibro-cystic disease this operation is contra-indicated unless the tumour is small, for the soft uterus cannot be pulled down, and powerful down-traction is a necessary element in the successful performance of the operation.

Since 1894 the author has been applying to fibro-myomata the vaginal method of operating, and an analysis of his cases shows that of all cases of fibroid coming to him 80 per cent were susceptible of treatment through the vagina. In the vaginal operation conservative treatment of the adnexa is more difficult than in the abdominal operation. The vaginal operation is particularly indicated in those cases which, when approached through the abdomen, are most difficult—the cases having retroperitoneal and other growths about the cervix.

*Operation.*—The chief aim of the operator is to so reduce the volume of the mass that it is rendered movable and susceptible of extraction *en masse* or after the classical hemisection. In doing this care must be exercised not to wound the great arterial anastomosis which lies upon either side of the uterus. The tissue is removed piecemeal by the procedure known as *morcellement*; and as each successive fragment is cut away that above is drawn down by stout toothed forceps. In order that these latter may hold in the tissues the structure of the uterus and tumours must be of fair firmness. It is because of the absence of this element of firmness that fibro-cystic tumours, unless small, should not be attacked through the vagina.

Taking as a typical example of the procedure a uterus which is nearly symmetrically enlarged, the first incision is into the posterior *cul-de-sac*. Through this a digital examination of the pelvis is made. A gauze pad secured by a stout string is then

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<sup>1</sup> This article should be read in conjunction with the one on Vaginal Ablation in Pus Cases.

introduced into the pelvis. This posterior incision is then continued around the cervix. The cervix is now seized by Péan's 4-pronged blunt forceps, and the operator begins the separation of the bladder from the uterus. This is accomplished by blunt dissection with the fingers, the palmar surfaces of which are pressed against the cervix; the bladder is literally rubbed up off the uterus. When this dissection has proceeded as high as the

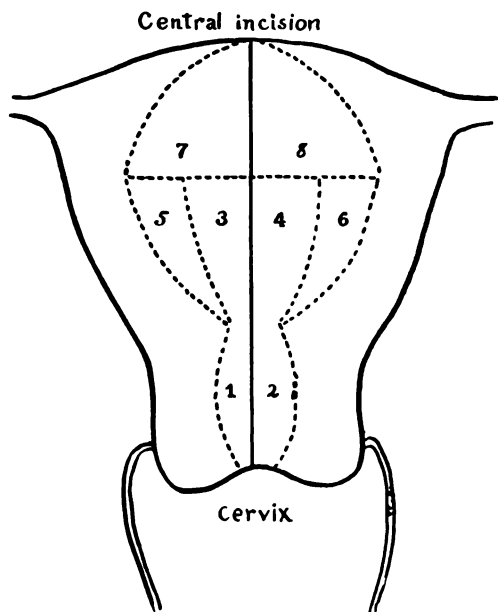


FIG. 121.—SCHEME OF INCISIONS INTO THE UTERUS IN PERFORMING MORCELLATION OF THE FIBROID ORGAN.

Extending through the centre of the entire anterior wall is the central incision. 1 and 2, the sections first removed from the cervix; 3 and 4, the sections first removed from the body of the uterus; 5 and 6, second sections from the uterine body; 7 and 8, large sections from the fundus uteri. Following along the outer dotted line it will be seen that three-fourths of the anterior wall of the uterus can be removed without injuring large arteries.

operator can reach, that portion of the bladder which has been freed is held up by the narrow trowel. The 4-pronged forceps is then removed and each angle of the cervix is seized by bullet forceps. The middle of the anterior lip of the cervix is then split by scissors as high as the attachment of the bladder. Each angle of this cut is seized by the sharp toothed traction forceps and rolled outward. As this is done the uterus will descend a little, and the operator can dissect up the bladder a little farther. The tissue of the cervix thus exposed is incised. Proceeding in this way,

alternately dissecting up the bladder and splitting the exposed uterine tissue, the operator enters the peritoneal pouch anterior to the uterus. Usually this section of the anterior uterine wall will have proceeded a little above the level of the internal os



before the peritonæum is severed. The operator next pushes the bladder away upon each side with his fingers, thus still further tearing the peritonæum bilaterally and completely freeing the uterus from its vesical attachments. It will now be seen that the body of the uterus is too large to pass the pelvic outlet. First from one side of the median incision, then from the other, a V-shaped piece of tissue is cut away with the scissors. As each piece is removed the stump above is seized by the sharp-toothed forceps. After removing a piece from each side of the middle line, the uterus can be brought still farther down. This downward displacement will often be facilitated by pressure by the closed fist of an assistant applied behind the pubis. More tissue is cut away upon each side in successive stages until the cornua appear beneath the bladder. The organ is then in shape for completion of the hemisection, upon finishing which the hysterectomy forceps are applied and the halved uterus removed. If fibroid nodules appear as the organ is cut, they are grasped and dug out of their capsules, thus reducing the size of the organ by that much. When large nodules are exposed they are best held by the corkscrew and so reduced in size by fragmentation that they can be extracted. All during the operation the uterine canal must be kept in view as

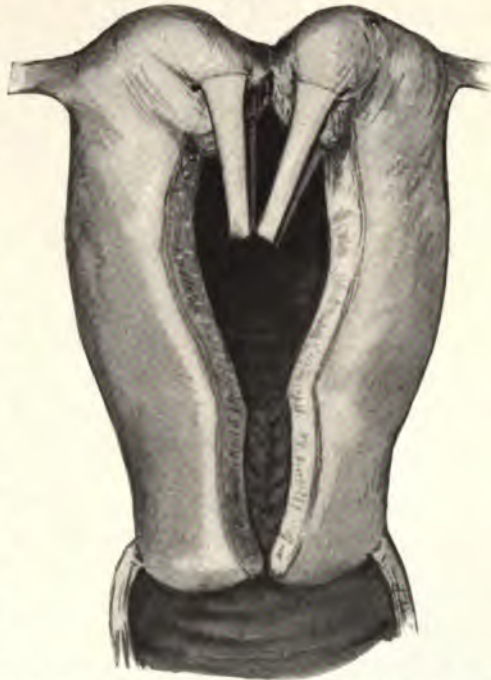


FIG. 122.—THE EFFECT OF THE MORCELLATION IS TO RENDER THE UTERINE WALLS NOT ONLY SMALLER BUT MORE PLIABLE.

This drawing shows how the cornua can be folded inward so as to be brought down beneath the bladder.

being the chief landmark for the guidance of the operator as he makes his incisions. If the chief nodule is located either between the bladder and uterus or beneath the peritonæum and posterior to the cervix, it is first attacked, for unless such a growth be removed the uterus will remain immovably fixed. The hemisection can proceed with comparative ease in intraligamentary growths, for they usually leave sufficient space between the uterus and symphysis for the section. And as the level of the intraligamentous nodule is reached the corresponding half of the uterus is cut into laterally so as to expose the nodule, when it can be removed. If there be a large pedunculate subperitoneal nodule present it may be necessary to remove the uterus first before securing this, but such a procedure is unusual, and if necessary an assistant should hold the fibroid by his hand, grasping it above the pubis lest it escape into the abdominal cavity. As a rule, it will be found that after completely dividing the uterus each half may be held to the side so that a corkscrew can be fastened into the pedunculate fibroid and its removal effected. Prolapse of the intestines is prevented by operating in the author's position or by the introduction of gauze pads secured by strings. But the presence of these is always an embarrassment. In making down-traction as the section proceeds, if this be done in the centre of the pelvis the organ may appear immovably fixed, whereas if it be rotated from side to side as it is drawn down, rarely will a more movable portion of it fail to appear of size sufficient to cut away. Even after the cornua appear it may be impossible to draw the fundus down sufficiently to complete the hemisection, and then it may be necessary to cut out a wedge from the fundus. The hysterectomy forceps are applied exactly as in the similar operation for pus in the pelvis. Whereas there are four cardinal vessels supplying the uterus, in fibroid disease the arterial supply may be atypical. The chief variation will be in the existence of a stout branch of anastomosis across the front of the cervix from one uterine artery to the other. If this is cut in the section of the organ it should be ligatured before proceeding further. The dressings are applied as described under the operation for pus, and the after-treatment is the same. The mortality from this operation is *nil*. It is unfair to compare it with the abdominal operation, for that operation has to contend with those huge growths which furnish complications high in the abdomen. Yet the vaginal operation suc-

cessfully overcomes complications which are most difficult to handle through the abdomen—intraligamentous and retro-peritoneal outcroppings. The great advantages attending the vaginal operation are found in the absence of section of the belly wall and manipulation of the small intestines, both of which are necessary in the abdominal operation. Therefore, interintestinal adhesions and ventral herniæ are not sequelæ of the vaginal operation.



FIG. 123.—THE FIBROID UTERUS, OVARIES, AND FALLOPIAN TUBES FROM A MAID OF FORTY-TWO YEARS.

The mass reached to the umbilicus. Removed by morcellation through the vagina.

The loss of blood during the operation is not serious if the section does not wander out too near the "pink tissue" at the sides of the uterus in which are the large vessels.<sup>1</sup> The operation may be classified as the *extraperitoneal treatment of the stump*, but differing from the old operation of Hegar in which the stump was fastened outside the abdominal cavity above the pubis, in that with the vaginal operation the stump is divided into 4 parts, and all drainage is at the lowest point of the peritoneal pouch and through a tube which does not absorb and does not become infected—the vagina.

<sup>1</sup> If the section of the uterine musculature is accompanied by embarrassing bleeding, this may be checked by deep injections of adrenalin (1 to 2,000) forced into the uterine tissues upon each side of the median line, as first suggested by Dr. Gordon, of Montana.

## CHAPTER XIV

### OVARIOTOMY

**Abdominal Ovariectomy.**—This is the removal of an ovarian tumour through an abdominal incision. If the tumour is small it may be removed by any of the abdominal incisions. Tumours of a diameter greater than 5 inches are preferably removed by the median abdominal incision. BECAUSE OF THE TENDENCY OF OVARIAN CYSTOMATA TO CONTAIN SEPTIC ELEMENTS, OR SIMPLE BUT MALIGNANT PAPILLOMATA, OR CANCEROUS PAPILLOMATA, THEY SHOULD ALWAYS BE REMOVED UNRUPTURED IF THIS BE POSSIBLE. The tumour is attached to its corresponding cornu uteri by means of a pedicle. This latter is composed of the ovarian ligament and upper part of the broad ligament, and the Fallopian tube is more or less involved. Upon examining the pedicle it will be seen to contain large venous sinuses, and arterial trunks may be seen and felt pulsating within it.

*Operation.*—Upon opening the abdomen the operator introduces so much of his hand and arm as will enable him to determine the presence and extent of adhesions. If none are present he extends his incision so as to enable him to even-trate the tumour. This is accomplished by holding the tumour up against the incision while the assistants depress the lips of the incision. As the tumour mass escapes it is rocked from side to side so as to facilitate its extrusion. Upon turning out the tumour the exact relations of the pedicle are determined by careful inspection.

Escape of the intestines is prevented by the introduction of a number of gauze pads, and other pads are arranged about the pedicle to catch bloody discharges when the pedicle is ligated and cut. An assistant should support the tumour so that it will not drag on the pedicle. The operator feels for a spot about the



centre of the pedicle in which there are no vessels and perforates this with a blunt aneurysm needle. The eye of this is then threaded with two heavy tendon ligatures and the needle is made to draw these through the pedicle. The needle is now laid aside, and the ligatures locked together by one twist. One half of the pedicle is next tied, the operator making the first knot single and employing the force steadily and long enough to reduce the elasticity of the tissues to a minimum, and the second and third knots are quickly tied. The other half of the pedicle is similarly treated. All strain upon the pedicle is now released and it is cut at a point above the ligatures high enough to leave enough stump to prevent the ligatures slipping off. The larger and more prominent vessels are now seized and separately ligated with very fine tendon. The objection to this method of securing the pedicle is the formation of a large mass of dead material outside the ligature, part of which becomes absorbed and part revitalized. By far more preferable is the method of Skene, by which the stump is dehydrated and rendered sterile, to become revitalized long after the vessels of the stump are obliterated. The larger the stump the greater the indication for this method of hæmostasis. The gauze pads are removed, the pelvis wiped dry, and the wound closed.

Certain complications are often met with in dealing with ovarian tumours. The *adhesions* to the abdominal parietes are best separated by the hand, which is passed carefully around the periphery of the tumour. Adhesions to the intestines are severed by scissors, all the dissection being at the expense of the tumour-wall; and the small thin layer of capsule left after such a procedure is united at its edges by a fine running suture so as to leave only its peritoneal covering exposed. Particular care must be employed in dealing with adhesions to the visceral mesenteries, for to produce there a bleeding which will require ligation of vessels would invite gangrene of the gut.

If the adhesions are so extensive or the tumour so large that they cannot be readily reached, it may be necessary to tap the tumour if cystic in order to reduce its bulk and permit of a careful dissection. To do this the edges of the incision, both beneath and above, are protected by gauze pads. The patient is rolled upon her side and the sac is grasped by any blunt polypus forceps, like Luer's or Hunter's. The tension may be so great that this is

impossible, and the sac must be at once tapped. The fluid is best evacuated through a large curved trocar. As the fluid escapes its physical characteristics are noted, and as the sac collapses it is drawn out of the wound so that its opening is entirely extra-peritoneal. After the fluid has ceased to flow lesser lobules may be broken into by the hand introduced through the incision in the main tumour. Often this procedure produces great hæmorrhage from the vessels ruptured in the trabeculæ of the tumour. In such an instance the pedicle must at once be grasped by heavy hysterectomy forceps and the separation of the adhesions between the tumour and viscera proceeded with. Should any fluid escape into the abdominal cavity the latter should be washed out by sterile saline solution after the tumour is removed and the pedicle ligatured.

If the tumour upon inspection proves to be *intraligamentary* there is no pedicle. Such a growth arises from the parovarium. Here one of two courses may be pursued. If the tumour be large, that part of the capsule which shows fewest important anatomical structures should be carefully incised. Such a point will commonly be between the Fallopian tube and ovarian ligament. Through this incision enucleation of the tumour is attempted. Or the tumour may be tapped, and after the pelvic anatomy has again become symmetrical a pedicle may be formed of the collapsed capsule. When the tumour has not risen above the pelvic brim it is the author's practice to operate by the vagina, opening the posterior *cul-de-sac*, evacuating the tumour by incision at its base, and inserting a gauze drain into the cavity. These tumours are merely large cysts of retention, the fluid being sterile. They are to be treated either by removal of the fluid-secreting sac or by evacuation and drainage, the latter preferably by the vagina. When the growths are bilateral, the proper procedure to apply is vaginal hysterectomy, with removal of the adnexa. In their evolution these tumours rip up the peritonæum from the lateral pelvic wall and displace the ureter. The ureter may cross the tumour at any point, and must always be identified before the capsule is split, otherwise it may be wounded.

After the enucleation of an intraligamentary tumour the ovarian vessels are to be ligated at the pelvic brim and again at the uterine cornu, and the round ligament is to be ligated near the pelvic brim. It will usually be found that the ovary and tube

have to be sacrificed in trimming away the excess of the capsule. After removing the loose flaps of capsule a running suture of fine tendon is employed to close the rent in the broad ligament. In dealing with a *solid* ovarian tumour, the growth must, of course, be removed whole. If the tumour be malignant, after its removal a careful examination of the lumbar and mesenteric glands should be made to determine the prognosis.

In about 15 per cent of cases of ovarian tumour a similar process will be found beginning in the other ovary; therefore, in all cases of ovariectomy the opposite ovary must be inspected and removed if found diseased.

Ovariectomy is generally one of the simplest operations and should be so conducted that normal structures are not wounded.

After completing the operation, the abdomen is closed without drainage. Occasionally cystic growths which have become infected will form such universal adhesions to important organs, such as the intestines and great vascular trunks, that to remove them will subject the patient to an unwarranted danger. In such an instance, the cyst should be tapped in such a manner as will prevent escape of its contents into the peritoneal cavity. After the cyst is empty its sac is stitched to the parietal peritonæum and abdominal fascia, and the rest of the abdominal wound closed without drainage. This will leave the cyst-cavity open for treatment. It should be packed with mild iodoform gauze. The intra-abdominal pressure rapidly closes the cyst-cavity—so rapidly in fact that the gauze packing may be renewed with difficulty. The cyst becomes obliterated by granulation and the dressings must be frequently changed.

**Vaginal Ovariectomy.**—When an ovarian tumour is of a diameter not greater than 3 inches it may be removed most successfully by the vagina without rupture; and much larger tumours may be so removed if they are ruptured to reduce their bulk. I prefer the posterior vaginal incision. Upon entering the posterior peritoneal pouch the tumour at once presents. Digital examination shows the exact relations of the tumour. If it is not adherent to intestinal coils it is grasped by dull pedicle forceps and dragged out of the opening and into the vagina. While holding it there the pedicle is perforated by the aneurysm needle and two ligatures of stout tendon are drawn through. These are locked and tied as high up on the pedicle as the fingers will reach.

The pedicle, still held by forceps, is cut through. After inspecting the stump to see that there is no bleeding the ligatures are cut short and the stump is allowed to recede. The vaginal incision is then closed at the sides, a small space being left in the centre for a drain of iodoform gauze.

Over this the vagina is lightly packed with iodoform gauze. All dressings are removed and renewed in a week, and the patient may be allowed out of bed in two weeks.

If the tumour fills the pelvis and has formed adhesions to important organs, it may be tapped after thoroughly exposing it by the vaginal incision, and as the capsule collapses it is drawn out of the incision. As the adhesions come into view they are readily and safely separated. The pedicle may now be secured, the tumour cut away, and the pelvis wiped dry. In every step of the operation great care should be exercised to protect the hands and ligatures against infection from the anus. This orifice must be kept constantly covered by towels, and each time the operator touches the field of operation it must be with hands freshly cleansed in bichloride-of-mercury solution.

A safer, more rapid, and neater way of securing the pedicle is by means of the curved clamp heated by Skene's method. With this all ligatures are dispensed with and a most attractive stump produced. Should the ovarian tumour be dermoid in character, the utmost care must be exercised in its removal lest it be ruptured, for the contents of these growths are often of a most virulent nature. Should such an accident occur, the soiled area must be carefully cleansed by means of swabs and covered by a large pad of iodoform gauze, which is removed only just before the sutures are tied.

### OPERATIONS FOR ECTOPIC GESTATION

**Abdominal.**—*Indications.*—No matter how extreme the collapse of the patient, inasmuch as this is due to the loss of blood and not to any form of infection, a ligature must be passed around the leaking vessel, and the shock appropriately treated. The abdominal operation is absolutely indicated in all cases in which the fetus is viable, whenever there is lithopædion, and whenever the fetus is too large to pass a posterior vaginal incision without morcellation.



It is contra-indicated in all cases in which the bleeding has ceased, in early cases, and in the intraligamentous cases.

*The Operation.*—Uterus curetted. The abdomen is opened in the median line. All old clots are turned out with the hand, fluid blood wiped away, and any bleeding point sought. This should be found, if possible, without placing the patient in Trendelenburg's position lest blood escape into the higher abdominal cavity beyond reach. If the case be one of simple tubal abortion a portion of the tube only being involved, a ligature should be carried around the ovarian artery outside the ectopic sac and all the involved portion of the tube cut away. The stump of the tube which is left should be treated by a continuous suture of chromic tendon, which will unite the mucosa of the tube to the peritoneal covering and control the oozing. This will leave a patent tube and one which can in future act as an oviduct. This conservative procedure is worthy of trial in most cases, for if the suture does not satisfactorily control the bleeding a mass ligature can then be thrown around the tube. If the tube has ruptured near the cornu, the tissues must be ligated upon each side and the entire tube taken away. The ovary should never be sacrificed. The operation having been completed, if there has been much escape of blood, or if there be shock, the peritoneal cavity should be douched with a gallon of normal salt solution 110° in temperature, wiped dry, and another gallon poured in which is left to overcome shock. The abdomen is closed without drainage. The tube upon the opposite side should always be examined, for bilateral ectopic gestation is not very rare, and ectopic of one tube is frequently associated with some form of adnexal disease of the opposite side.

If upon opening the abdomen the case is found to be a true intraligamentary pregnancy, the vagina should be opened from above and the sac entered at its lowest point. After turning out the clots a stout drain of iodoform gauze is passed into the opening between the folds of the broad ligament and out of the vaginal incision. The abdomen is then closed without drainage.

If the pregnancy be advanced and the placenta fully formed, the cord should be tied and the fœtus removed. The problem then presents of the preferable method of dealing with the placenta. If the placenta be attached to the tube, the uterus, or the abdom-

inal wall, its removal between numbers of ligatures may be attempted; but if attached to the pelvic floor, to the intestines, or to the mesentery, any attempt to remove it is attended by too great risk of fatal hæmorrhage. If the case be one in which the placenta is small, the cord may be ligated close to the mass and the abdomen closed without drainage, the placenta becoming absorbed subsequently. If, however, the placenta be large, an abdominal Mikulicz of weak iodoform gauze should be made to completely surround the placenta and the gauze lead out of the abdomen. As the placenta breaks down it will be taken up by the gauze, repeated changes of which will be necessary. If the fœtus has been dead for a long time, the vessels nourishing the placenta may have so far atrophied as to admit of a careful separation of the placenta and closure of the abdomen without drainage.

Whenever the placenta is situated low down in the pelvis, yet away from the vagina, this latter should be opened and the placenta surrounded by iodoform gauze the ends of which are led into the vagina.

During the years 1886 to 1896 the late Dr. R. P. Harris found reports of 50 laparotomies in which the fœtus was living, 38 per cent of the mothers dying from the operation, showing the great risk attending the operation when the placenta is active. Whenever the placenta is large and cannot be safely removed, its location may sometimes be isolated from the general peritoneal cavity by suturing the sac to the parietal peritonæum and then packing the placental site with iodoform gauze. But at most, all operations for advanced ectopic gestation carry a deplorable mortality.

**Vaginal.**—*Indications.*—In all early cases, whether ruptured or unruptured, in all cases of intraligamentary pregnancy, the vaginal operation is indicated.

It is contra-indicated in all cases where the fœtus is too large to pass the vaginal incision, with one exception. Whenever the ectopic of one side is accompanied by destructive disease of the other, vaginal ablation of the uterus and adnexa is the safest procedure. This may be applied in even advanced cases, provided the fœtus is not attached high up. Such are the possibilities of the vaginal method of approaching this condition in all cases where the lesions are pelvic that the author advises that the first exploratory stage be performed through the vagina. In 90 per

cent of the cases coming to us it will be found that the operation can be completed through the vagina.

The uterus is curetted, cleansed, but not packed. The posterior *cul-de-sac* is opened. All blood-clots and fluid blood are evacuated and the pelvis wiped dry. The patient is then lowered into the author's position and the intestines held up by a gauze pad secured by a string. The ectopic tube is sought for and brought into the vagina. If the sac be very small, of a diameter less than  $\frac{1}{2}$  an inch, it is incised along its dorsum and its contents carefully scraped out. The cut edges are then united as described in salpingostomy. Such early cases are not often met with. After carefully and for several minutes studying the amount of oozing resulting, the gauze pad is removed and the angles of the vaginal incision closed by suture, a small iodoform gauze drain being introduced between. But if the bleeding is not controlled by the suture, and in cases where the sac is over  $\frac{1}{2}$  an inch in diameter, it may be grasped by Skene's forceps and subjected to the electrical current sufficiently long to desiccate the stump. The sac is then cut away and the vagina closed as before.

If the pregnancy be intraligamentary an opening is to be made into the posterior layer of the broad ligament, the clots turned out, and a generous iodoform-gauze drain inserted into the ectopic cavity. It is well in all such cases to search also for the small foetus or foetal *débris*.

If the rupture be an old one, the pelvis being merely filled with old clots (intraperitoneal hæmatocele), and there being no evidence of recent bleeding from the sac, it is not necessary to remove the tube. But before adopting such a course the operator must be convinced that shrinkage has already begun in the ectopic tube, as will be evidenced by its beginning exsanguination. A safer course is to remove the tube. Should Skene's apparatus not be convenient, the requisite ligatures can with safety be placed upon each side of the ectopic mass.

If the pregnancy has advanced to the formation of a distinct placenta, and this is within reach of a vaginal drain, the foetus should be taken away and the placental site isolated by a large quantity of iodoform gauze. Removal of the placenta through the vagina should never be attempted.

In case an ectopic sac be found upon one side and the opposite adnexa destroyed by disease, vaginal ablation is indicated.

Whenever a hæmatocele or placenta is found the vaginal incision is to be left open without suture; in other instances most of the vaginal incision may be closed by suture.

IN VIEW OF THE ABSOLUTE SAFETY OF THE EXPLORATORY VAGINAL INCISION IT IS TO BE MADE SO SOON AS THE BARE POSSIBILITY OF AN ECTOPIC GESTATION IS ENTERTAINED. It is no longer necessary to wait for evidences of hæmorrhage and shock before arriving at a positive determination of the nature of a pelvic mass.



## CHAPTER XV

### *CONSERVATIVE OPERATIONS ON THE UTERINE ADNEXA*

It is but a few years ago that for the most trivial reasons the ovaries were sacrificed. The unthinking and rash way in which those who posed as specialists in the diseases of women operated and removed organs which did not conform to some ideal in structure which the operator had adopted, very justly brought the specialty of gynæcology into disrepute. A better knowledge of the physiology and of the pathology of diseases peculiar to women have brought about a most radical change in our views regarding the propriety of removing the ovaries and tubes. The ovaries, at least, have been shown to be most intimately associated with metabolism, and the function of menstruation is so interwoven with woman's mental as well as physical life that it is conserved even if elaborate and hazardous procedures must be adopted to accomplish this as well as cure the patient. This change in our opinion, or rather estimation of the value of these organs, has been brought about by the unfortunate women who were first subjected to mutilating operations; and investigation, instead of preceding work of such gravity, has come after the failures. The whole trend of modern surgery is to conserve so far as possible the physiological activity of the woman by not removing any organ at all, but where removal is imperatively indicated, to effect a permanent and radical cure. The conservation of special organs which are diseased must not be carried too far, however. There is a broader conservatism which seeks the preservation of the general health at the sacrifice of even important structures. In no field of surgical activity do extraneous circumstances have so much weight as here. Some women prize even badly diseased organs more than health, while to others their loss is worse than death. These sentiments are perfectly proper, and should be given due weight in considering the propriety of a pro-

posed operation. The very worst that can be said of conservative operations is that they sometimes fail to cure, but they often succeed in effecting a cure without mutilation. The latter cannot be said about primary radical operations. Radical work is yet possible after conservatism has failed. But conservative operations should be employed with as much judgment as the radical, and should not be misapplied. The word conservatism should not be used as a cloak for neglect to apply the proper treatment. The man who adopts the morphine-poultice-douche plan of treatment of an acute pelvic peritonitis is not conservative. On the contrary, he is largely responsible for any gross lesions which may occur. Ignorance is not conservative nor operation necessarily rash.

It is wise to precede all operations upon the uterus or its adnexa by a cleansing curettage.

**Abdominal.**—In very many instances of pelvic peritonitis the sole sequelæ are adhesions which bind together the organs, limit their mobility, and interfere with their circulation. To permit these false bands to remain is to invite very many disturbances in function of the various pelvic organs, and even grave structural lesions of the ovaries and tubes.

In *severing adhesions* the abdomen is opened in the median line. Upon entering the peritoneal cavity digital examination will show the degree and extent of the adhesions. It is unwise to sever these guided by the sense of touch alone. It is far better to inspect each adhesion before breaking it. To do otherwise is to run the risk of tearing the tissues so as to require sutures and ligatures to repair the injury. The recent union between the viscera can readily and safely be severed by the finger; but when the lymph has become fully organized it will not easily break, rather will an attempt to do so tear the softer tissues such as the tube or intestine. Old firm adhesions are preferably severed by means of a delicate pair of blunt-pointed scissors. Even when deep in the pelvis they may be seen by employing Trendelenburg's position, aided by the proper adjustment of retractors. It is a waste of time to sever adhesions between ligatures, for few of them have vessels which can produce troublesome bleeding. After they are cut, adhesions curl up against the viscus to which they are still attached, and ultimately shrink so as to almost disappear. After all adhesions are severed the pelvis should be wiped dry and the abdomen closed without drainage.

*Hydrops folliculi*, or cystic ovary, is best treated by simple puncture of the cysts where these seem to be superficial. But when the greater part of the ovary is the seat of such a change the cyst-bearing area should be excised by a V-shaped incision which extends through the long axis and down through the free border of the organ. The resultant wound is to be closed by sutures. Should the bleeding be free, the mattress suture is applied; otherwise a running suture of fine tendon will suffice. The function of the ovary is maintained if even a very small portion of its stroma is left. The ultimate results of mere puncture of the cysts are poor, the tendency to their formation asserting itself in a few months after the operation. The results of excision of the cyst-bearing area are far better.

*Corpus luteum cysts* are to be treated by incision, not mere puncture. The cyst should be cut throughout its long axis. The yellow wavy line in the cyst is then seized with toothed forceps and the lining of the cyst peeled out from its attachment to the ovarian stroma. This leaves loose flaps, which are trimmed. One or two sutures of fine tendon suffices to close the wound.

It is hardly advisable to seek to preserve a portion of an ovary the seat of a *neoplasm* unless this be pedunculate. Occasionally but a small portion of the ovary will be involved in the new growth, but only in very rare instances. Excision of the involved area is then indicated only, of course, if the growth is benign.

In no instance of *ovarian abscess* should conservatism be attempted, even when the suppurative process appears to be limited. If the pus sac is incised and left open it must be drained with a certainty of infecting adjacent structures; and it is equally inadvisable to close it by suture. Abscess of the ovary invariably calls for its sacrifice when approached through the abdomen.

*Hydrosalpinx*.—It is seldom that a hydrosalpinx will be met with which will necessitate the sacrifice of the entire tube. Even if but a small portion near the cornu be uninvolved, it should be saved. These retention cysts have sterile contents, and can be safely evacuated. The tube should be incised along its free border for the entire length of the enlargement. The loose flaps of the thin walls are then trimmed away until the normal portion is met with. Should small vessels be met with which spout, they are ligated. At that portion of the tube where it is intended



the new *ostium abdominale* shall be, a running suture is so applied as to draw the tubal mucosa over to its serosa. If it is found necessary to remove the entire tube its mesentery is ligated by a series of fine ligatures and the tube tied close to the cornu of the uterus. The tube is then cut away. The supports of the uterus and the ovary are not interfered with. The abdomen is closed without drainage.



FIG. 124.—SALPINGOSTOMY, OR THE CONSTRUCTION OF A NEW OPENING IN AN OCCLUDED FALLOPIAN TUBE.

C, cornu uteri; O, ovary; T, Fallopian tube.

When the tube is merely *occluded* owing to peritonitis about its fimbriated end, the operation of *salpingostomy* is to be performed (Fig. 122).

The free border of the knobbed and occluded fimbriated end is split with scissors for about 1 inch. The inverted fimbriae are then turned out and the cut edge of the mucosa is united by a running suture to the serosa. Even if the contents of the tube be milky, not purulent, and there be no evidences of an acute process, this operation is indicated. Little benefit is derived from the operation when the tube is in a condition

of sclerosis, as pachysalpingitis. In order for the tube to act as an oviduct its peristalsis must be restored. Merely establishing a new *ostium abdominale* does not do this, and salpingostomy is useless unless the muscular coat of the tube be normal. It may therefore be stated that all chronic tubal lesions due to a primary salpingitis contra-indicate salpingostomy, but where the lesions are merely sequelae of a pelvic peritonitis the operation is often indicated. The abdomen is closed without drainage.

If acute salpingitis exists, or a pyosalpinx be present, conservatism, as applied through the abdomen to either condition, is out of the question. To open such a tube is to expose the peritonæum to its filthy contents without providing means for the inflammatory products to escape.

In *ectopic gestation* involving the tube much can be accomplished by conservative work in many cases. The rule is to remove only so much of the tube as is implicated in the ecto-



There will usually be found at least a portion of the tube which is free from invasion, and though this be highly coloured and very vascular, it will involute after the ectopic sac is cut away. The tubal mesentery is ligated by a series of ligatures to the point at which the tube is to be cut off. Here a ligature is thrown around the tube and twisted, not tied. The tube is then cut away and the twisted ligature loosened sufficiently to allow the vessels to reveal their presence by bleeding. If only a few of these show they are tied, and if there be a parenchymatous bleeding continuing, the attempt should be made to control it by a running suture. Should the cut tubal walls continue to bleed the ligature which was thrown around the tube is tied, the operator abandoning all attempts to leave an open *ostium abdominale*. Whether subsequently a tubal stump so treated becomes patent, I cannot say, but from experience with other conditions we are warranted in stating that such a result is possible.

This conservatism is applicable only when the ectopic sac is small and when speed in operating is not rendered necessary because of great loss of blood and shock. The abdomen is closed without drainage.

A *prolapsed*, even though adherent, ovary should not be removed. It is to be freed from all false attachments and lifted up to the level of the cornu of the uterus. A fine tendon suture is then passed through the mesentery of the ovary, and again through the insertion of the ovarian ligament into the uterus. Upon tying this the ovary is drawn up and becomes attached by the plastic lymph which is effused about the suture. The mesentery of the ovary is selected for the passage of the suture because, though highly vascular, it is of firmer texture than the ovarian stroma proper.

The abdomen is closed without drainage.

**Vaginal.**—It has been seen that there are certain cases of tubal disease which are treated by removal only when approached by the abdomen. The reason for this is that drainage would be necessary to prevent serious accidents, and along the track of the abdominal drain intestinal and ventral lesions of importance would occur. But by operating through the vagina drainage can be employed without harm resulting, and therefore certain purulent accumulations in the adnexa are amenable to the conservative vaginal operation while denied similar treatment through the ab-

domen. It may, however, be fairly stated that whenever complicated ligation or suture of tissue is needed the vaginal operation is contra-indicated owing to technical difficulties.

*Hydrosalpinx* is treated with perfect ease and success through a vaginal incision. The tube is split along its dorsum and the loose anæmic flaps trimmed away. To accomplish this, after the tube has been freed from adhesions it is drawn into the vagina and held there by a delicate ovarian forceps. After wiping away all fluids the tube is returned and the edges of the incision are closed by tendon sutures except at the middle, into which a wick of iodoform gauze is introduced. The vagina is packed with gauze. The *cul-de-sac* drain is removed in a week and renewed, and the patient allowed out of bed with a snug supporting vaginal dressing of iodoform gauze. In five days the second *cul-de-sac* gauze is removed and is not renewed, but the vagina is kept packed until the incision closes tightly.

If there be *adhesions* between the pelvic viscera, these are readily broken up through a vaginal incision and under the guidance of the eye if the patient be thrown into my position. The longer adhesions may be caught up with a blunt hook and held while being severed with scissors. The angles of the incision are closed and a slender drain of gauze inserted, as above described, if there be much oozing; but if there be no parenchymatous bleeding, the entire incision may be closed after wiping the pelvis dry.

If the tube be merely *occluded*, a salpingostomy is to be performed in the same manner as through an abdominal incision. The vaginal incision is to be only partially closed, as it is impossible to positively know whether the contents of an occluded tube are sterile.

If a tubal *ectopic sac* exists which can be treated conservatively, the vaginal method of operating is inferior to the abdominal in certain cases and superior in others. In the advanced cases the tube is drawn down into the vagina and seized with Skene's curved clamp. After desiccating it the sac is cut away, and no ligatures are necessary. The pelvis is wiped dry and the vagina close.

In the very earliest cases the tube is opened along the border and the tubal contents curetted out. If there be oozing the tube is either treated by Skene's method or ligated cut away. But in certain of these very early cases, when it is opened and curetted, the oozing is slight and the tube



returned without ligature or suture. In such an instance the angles of the vaginal incision only are closed and the centre is drained by gauze.

Owing to the exceeding friability of these ectopic tubes sutures are not readily placed in them through a vaginal incision, but owing to the ready escape of blood through the open centre of the vaginal incision much can be left to nature in the way of controlling parenchymatous bleeding.

The strongest claim which the vaginal method of operating has to our consideration is in the treatment of *acute salpingo-oophoritis* and *acute pelvic peritonitis*.

If the uterus has not been previously curetted this is now done (see Curettage). If curettage has been done some days before, the uterus is simply irrigated with boric-acid solution. Upon opening the posterior *cul-de-sac* serum and lymph-flakes escape. The finger is inserted into the cavity behind the uterus, and proceeding towards the lateral pelvic walls all the tender lymph planes are easily severed by the finger. The tubes are freed from their attachments to broad ligament or viscera and gently brought to the vaginal vault for inspection. It is not a difficult matter to open the fimbriated ends with any blunt instrument, the tubes being held by ovary forceps. A strip of iodoform gauze is inserted into the tube to the uterus. This is left in place until the operation is over. A small amount of fluid may escape from the tubes, clear or cloudy. It is now proper to wipe the pelvis dry. The ovaries are palpated and loosened from adhesions. The operator makes his investigation of the broadest kind. No false attachments between the organs should be overlooked. Every lymph plane should be entered and broken up. Convinced that the tubes are open and that no organs have been left matted together, the gauze pads are removed, the pelvis is carefully wiped dry, and the strip of gauze in the tube is withdrawn. The uterus is packed with iodoform gauze. Into the opening in the *cul-de-sac* strips of iodoform gauze are inserted so as to snugly fill the opening. These extend up behind the uterus to the level of the internal os. The uterus, carrying with it the dressings, is then lifted up into its normal position in the pelvis, and the vagina is packed with gauze. In two days the vaginal and uterine packings are removed and the vagina again packed. The *cul-de-sac* dressing can usually remain for a week. It is then removed and renewed. The dress-

ings are renewed about once in five days until the wound closes. In this operation the surgeon seeks to open the lymph streams and tubes so as to cause them to leak. This he would not dare do had he not provided through his gauze a means of escape for the discharges.

There no longer being a necessity for locking in infection, the tissues do not attempt it. The curetting having cut short the source of infection, no fresh supply is furnished. The causative focus in the uterus has been removed and the complications attacked by evacuation. The question is suggested, Does not lymph form about the gauze in the *cul-de-sac*? Undoubtedly; but I wish to call attention to the difference between the character of the lymph which forms about an absorbent antiseptic dressing and that which is the exponent of infection. The first is not accompanied by pain, by fever, nor by pus; it is evanescent and produces but few bands of adhesions, and these not permanent. Furthermore, it is limited to the *cul-de-sac* and does not implicate the tubes. Lymph the result of infection is absolutely different. Its production is accompanied by fever, by occlusion of the tube, by thickening of the ovarian capsule, by great pain; and it is permanent or else results in the stoutest kind of adhesions. Moreover, it is extensive in its distribution. The operation is the counterpart of another where the infected focus is cleaned out and the limb above incised to permit the escape of the products of the progressing infection, as in cellular infection of the hand and arm. In very many cases I have done this operation, and never have I failed to check the process. The operation goes a step further than curettage. It is not only conservative, but is curative. To deny it to the woman is to refuse to believe that her most highly vitalized organs have power of repair when aided by incision and drainage. It is absurd to state, as some do, that there is nothing between the let-alone policy of the midwife and the mutilating operation. From the moment the adnexa are attacked by infection, evacuation and drainage govern us. This operation becomes in the hands of the practitioner the means by which he prevents suppuration, and by applying it early he cures his cases permanently. It certainly takes some courage to come from behind the protection of the hypodermic syringe and thrust oneself in the position of responsibility for the result. Morphine, the punction, and hot douche but lull the patient into a state of inse-



bility to her danger. To apply these is to do nothing; to replace them with this operation is to speedily and permanently cure these patients. Not the least attractive attribute of the operation is the ease with which it may be done. It is entirely free from danger.

*Chronic Pelvic Suppuration.*—In cases of long-standing pelvic suppuration, cases which can so often be designated as diffuse pelvic suppuration, either radical or merely palliative operations may be applied through the vagina. It matters not whether the pus is in the tubes or ovaries or has burrowed between the adherent organs. In these cases the operator, because of extraneous circumstances or because his patient is too ill to bear a radical operation, decides to evacuate the pus. This he does in such a manner as, combined with the skilful application of his dressings, will secure obliteration of the pus sacs. This result is obtained by the production of connective tissue, and the case is converted into one very similar to that designated as genital sclerosis. And whereas patients so treated often suffer from dysmenorrhœa and pelvic pain, they continue to menstruate, and have none of the disagreeable symptoms attending the artificial menopause. It is my experience that when pus sacs have become converted into mere connective-tissue masses, suppuration in them does not often again occur.

The merely palliative operation is positively contra-indicated when the suppuration is due to tuberculosis.

The patient is placed under general narcosis and in the lithotomy posture. The uterus should be curetted and swabbed out. The operator then grasps the cervix with blunt traction forceps and holds it up while he makes the posterior incision through the vaginal tissues. The uterus is usually so fixed that it cannot be pulled down, so the operator enters the peritoneal pouch rather high up. In making this breach into the peritoneal cavity the index finger far surpasses all instruments. After entering the cavity the finger is worked up behind the uterus and upon each side seeks out the pus pockets. If these can be broken into with the finger it should be done, but if too tough for this, closed scissors may be employed for the purpose. As each cavity is emptied the opening is enlarged with the fingers. No attempt is made to break up the isolating dome of adherent organs which lie above those inflamed, nor should irrigation be employed lest pus be washed through a small opening into the higher and more

important peritoneal cavity above. The purulent cavities are merely sponged dry. Each cavity is then carefully packed with 5-per-cent iodoform gauze, and the pelvis as well is drained by the same material. The dressings are removed and renewed as often as needed, and not a little skill is required to adjust them so that the suppurating cavities will not close too soon. We have found by bacteriological examination that the dressings sterilize the field of operation. After healing is completed the local treatment should be by tampons of ichthyol (10 per cent) applied twice a week.

The operation is applicable to either unilateral or bilateral suppuration, and is the one I almost always apply to the exclusion of all others in pelvic suppuration in young women. It is not to be confounded with the old trocar puncture and drainage-tube treatment. If the trocar did not find pus it was no evidence that pus did not exist, and if pus was found, the treatment did not prevent its recurrence. The trocar puncture was a blind procedure and violated one great surgical rule in that it merely evacuated pus without obliterating the cavity in which it formed. Over 50 per cent of cases of pelvic suppuration treated as described are so much relieved that they refuse a subsequent radical operation.

### ABDOMINAL SALPINGO-OOPHORECTOMY

Salpingo-oophorectomy is the removal of the ovary and tube, and may be performed upon one or both sides. It is indicated in all cases of tubo-ovarian disease in which conservatism is not possible. It is also much used as a palliative method of treatment in uterine fibro-myomata. I regret to state that the operation is also performed to induce artificial menopause, in the mistaken belief that menstruation has a certain causative relation to epilepsy, hystero-epilepsy, nymphomania, and other neuroses.

An ovary and tube may be removed by a lateral incision over the affected side, or by a curved suprapubic incision, or through the median abdominal incision. As a rule, the last is the proper route, as through it both sides may be attacked with the greatest ease and previously undiscovered complications more readily corrected than through any other abdominal incision.

The technique of the operation varies somewhat with the lesions.



**Normal Salpingo-oophorectomy.**—The removal of normal ovaries and tubes is no longer countenanced except for two conditions. It is done to prevent future pregnancies in a case which is being subjected to Cæsarean section, but even here other operations are preferable because not necessitating the sacrifice of the ovaries. Among gynæcological procedures the only legitimate application of the operation under discussion is for the purpose of checking the further growth of *fibro-myomata uteri*.

The incision into the peritonæum should be only long enough to admit two fingers. Upon opening the abdomen one ovary and tube are held up in the incision so as to make the infundibulopelvic ligament stand up from the pelvic brim. In this band of peritoneal tissue lie the ovarian vessels, and when they are lifted up in this manner they are removed from the ureter which lies beneath them. The operator passes a blunt pedicle needle armed with medium chromic tendon and ties the ligature with care. Another ligature of similar character is passed around the ovarian ligament and Fallopian tube far enough from the cornu of the uterus to miss the round ligament. The ovary and tube are then cut away, enough tissue being left to prevent the ligatures slipping. Two ligatures upon each side will suffice. If small veins in the cut broad ligaments bleed they may be separately caught and tied. It will be observed that the ligatures are all tied independently of each other. The locked ligature is unsafe, as it renders slipping from one stump easy, thus causing secondary hæmorrhage. After inspecting the pelvis and wiping it dry, the abdominal wound is closed without drainage.

**Simple Retention Cysts.**—The various forms of hydrosalpinx and tubo-ovarian cysts may be so classed. Inasmuch as these accumulations, although of inflammatory origin, are free from germ life, the possibility of conservatism must be eliminated before their removal is decided upon. The tube and ovary are usually found low down in the pelvis and adherent to the posterior face of the broad ligament. They are gently freed and brought up into the incision. In doing this much care is necessary because the cyst-walls are exceedingly thin. If ruptured during the manipulations no harm will be done except that it is more difficult to handle them when they are collapsed. After the organs are thoroughly freed the ovarian vessels are ligated. The operator then passes a ligature around the ovarian vessels just below

the attachment of the round ligament, where it may be felt pulsating. This he now ties. The tube is then cut out of its insertion into the uterine wall, and the tube and ovary cut away from their other attachments (see Fig. 125). Two sutures are now employed to close the V-shaped incision in the cornu of the uterus, and a running suture closes the rent in the broad ligament. The abdomen is closed without drainage.

**In Pyosalpinx and Ovarian Abscess.**—*Median Abdominal Incision.*—In removing a purulent focus from one side, the first

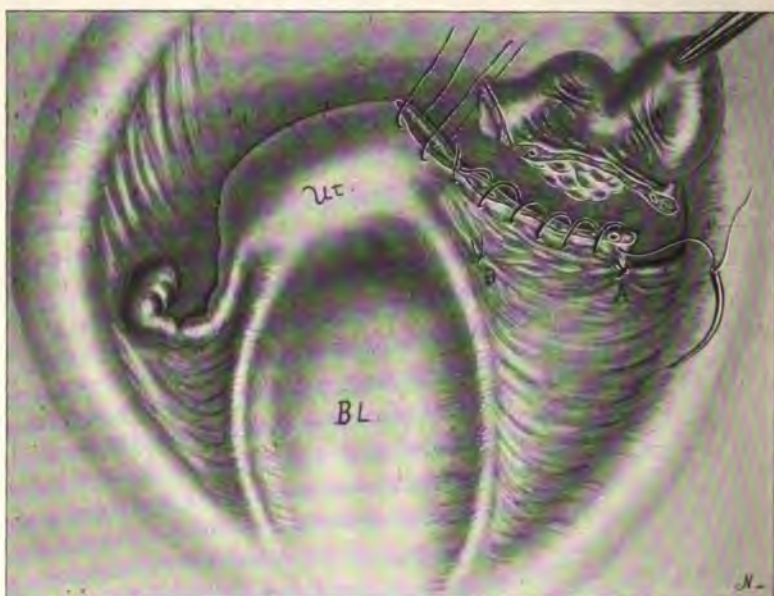


FIG. 125.—BOVÉE'S METHOD, AND THE ONLY PROPER ONE, OF REMOVING A PUSTULE.

*A*, ligation of the ovarian vessels of the pelvic brim; *B*, ligation of the ovarian artery in continuity beneath the Fallopian tube, where it anastomoses with the uterine; *BL*, bladder; *Ut*, uterus.

essential step is freeing the omentum and intestines from all adventitious attachments in the pelvis. They are then held back by gauze pads which circle the pelvic brim from one loin to the other. The incision should be made long enough to permit a thorough inspection of the pelvic contents when the edges of the incision are retracted. The vast majority of these inflammatory growths lie behind the broad ligament and low down. To free them the



operator introduces one finger down behind the uterus, and by means of a sawing, lifting motion he peels the ovary and tube away from the broad ligament and pelvic floor. The reason he can do this is because the attachments have formed not between raw surfaces but between masses of plastic lymph. The greatest difficulty will be experienced in this step when the fimbriated end of the tube is reached, for there the peritonitis was most intense. If the lesions have been caused by streptococci, the lymphatic glands beneath the peritonæum may have broken down, and then is produced both intraperitoneal and retroperitoneal suppuration about the pelvic brim, distorting the anatomy by lifting up the ureter and rendering enucleation most difficult. In such a case one or the other pus pocket may be broken into. As the tube and ovary become somewhat freed, the operator may employ 4 fingers in effecting the liberation of the adnexa. Whenever a pus pocket is broken into the parts are wiped dry by iodoform gauze and the operator cleanses his hands anew in lysol and bichloride solution. When this accident happens, the advantage of placing a dam of gauze pads about the pelvic brim becomes apparent. HOWEVER GREAT THE DIFFICULTIES ENCOUNTERED IN THE LIBERATION OF A PUS-TUBE OR OVARY, NO ATTEMPT AT LIGATION OF VESSELS SHOULD BE MADE UNTIL THE SEVERAL VASCULAR POINTS ARE FULLY IDENTIFIED. The operator should have the entire field of interference exposed for unobstructed inspection. He should be able to identify the fundus uteri, the round ligament, the tube at its insertion into the uterus, and the important anatomy at the bifurcation of the common iliac artery. A careful consideration of all the anatomical structures, as well as of the lesions which mask their regional association, is of prime importance before any attempt is made to free the diseased structures or to apply ligatures. The operator is much aided in his work after he has liberated the omentum and small intestines from all false attachments in the pelvis, if he will drop the patient into Trendelenburg's position sufficiently to prevent the respiratory movements and intra-abdominal pressure forcing the intestines into the field of interference. After the ovary and tube are thoroughly liberated so that they are attached by their anatomical relations only, the first ligature of medium chromic tendon is applied to the ovarian vessels. This should be outside the involved field if possible. This ligature is tied and its ends cut short. The ovarian artery is then

sought along the side of the uterus and is secured by passing around it a curved aneurysm needle, which is made to draw a medium chromic-tendon ligature through. Upon tying this latter the blood supply to the ovary and tube is cut off, and these organs may be removed (see Fig. 125). It is well to save the round ligament, if that be possible, but in certain old cases it is impossible to separate the tube from the ligament. In such a case it will be necessary to ligate the round ligament separately. The union between the tube and the posterior face of the broad ligament is not so difficult to separate, but attachments between the pus sac and the rectum are usually most firm. The suppurating tube has a weakening effect upon the intestinal wall, and therefore the liberation of the tube from the rectum must be most carefully effected. If a communication once existed between the intestinal and tubal cavities, the separation of the tube may be impossible without breaking into the intestine. If that accident occurs, the enucleation and removal of the pus sac must be rapidly completed, and the necrotic edges of the intestinal fistula trimmed and closed by two tiers of interrupted sutures of fine chromic tendon. In such a case the sphincter ani must be rendered incompetent by forcible dilatation so as to permit the freest escape of gases. Such wounds in the rectum readily heal. After removing the diseased tube and ovary a careful inspection of all parts of the pelvis is to be made. Bleeding from broad surfaces is usually parenchymatous. It may be checked by dipping a gauze sponge into very hot saline solution and applying it to the oozing surface for a few moments, or by lightly touching it with tincture of iodine. Most of the bleeding coming from a pronounced point will be found to be venous, but all such points should be ligated. After all bleeding has ceased iodoform gauze should be applied against the raw surfaces and left there during the application of the sutures. Before beginning this the operator should carefully cleanse his hands as well as the edges of the wound. The abdomen is closed by interrupted sutures applied in two tiers. Before tying the sutures all the gauze is, of course, to be removed and the omentum pulled down into place. If a large pus sac is ruptured during its manipulation a its contents scattered over the intestines the greater part of it can be wiped away, but along the mesenteric folds uns quantities may be hidden. If the patient is in Trendelenbu position when this accident occurs she should at once be low

to the horizontal, and the pelvic and abdominal cavities irrigated by gallons of saline solution, one hand being employed to move the intestinal coils back and forth so that all parts of them may be washed. As the saline solution wells up and out of the wound it will be seen to carry out the flakes of lymph and pus. After irrigation is complete the abdominal cavity and the pelvis are thoroughly dried, and the operation carried to completion. The irrigation of the pelvis and abdomen accomplishes much. It has, for instance, been shown that saline solution is mildly antiseptic, and that it is not damaging to the tissues. It further so dilutes the pus that it becomes inert, and it also facilitates its ready absorption by the peritonæum.

If the vermiform appendix is found adherent to the inflamed mass it should be removed, preferably by inversion if that be possible.

In no instance should an abdominal drain be employed after removing a pus focus from one side. If the operator has been unable to check all oozing, or fears that a point of suturing in the rectum may give way, he may open the posterior *cul-de-sac* and pass a drain of iodoform gauze down into the vagina.



## CHAPTER XVI

### *MANAGEMENT OF PATIENTS WHO HAVE BEEN SUBJECTED TO CELIOTOMY*

THERE are three phases to this. Of most importance is the general treatment, that directed to the wound and the peritoneal cavity not demanding the attention necessary in preantiseptic days. The most immediate distress comes from nausea, and as the vomiting strains the wound it should be minimized. Those with dilated stomachs and those who are obese are more comfortable with a pillow under the head. As a rule, spare patients vomit less if their heads are low. The nausea is in all cases somewhat lessened by the inhalation of the fumes of vinegar upon a handkerchief and by a small ice-bag over the xiphoid. Very dry champagne and cracked ice allays vomiting. It may be given in  $\frac{1}{2}$ -ounce quantities every half hour or hour, beginning four hours after the operation. If the tongue be furred and the case septic,  $\frac{1}{2}$ -ounce doses of iced water with 5 drops of lemon-juice will lessen vomiting. The imbibition and injection of water before operation has done away with much of the post-operation thirst; but in emergency cases, where preparation is impossible, the thirst may be diminished by the acidulated water mentioned, and particularly by rectal enemata of 8-ounce quantities of normal salt solution given every four hours. The patient is comforted by holding an iced cloth to her lips. It is unspeakably cruel to withhold water for the first day. It is perfectly safe in most cases to begin the acidulated water in four hours. However, if the stomach be particularly irritable, it is better to keep it quiet. The pain suffered is not so severe as many patients represent it. The loudest outcries are by women who have been taught the use of morphine. It is my practice to withhold morphine unless the unreasonable conduct of the patient compels me to satisfy her



craving. I then give, and only when I am compelled to do so,  $\frac{1}{4}$  of a grain of codeine with  $\frac{1}{16}$  of a grain of hyoscyamine. Opium relaxes the pylorus and allows bile to regurgitate into the stomach, thus producing vomiting. The matter vomited after ether is usually glairy mucus, after opium it is bile-stained. This drug also paralyzes the intestines, thereby conducing to retention of fæces, tympanites, and sepsis. Active intestinal peristalsis is inimical to infection of the peritonæum. The relief afforded by opium is but a borrowed ease, to be paid back later by much vomiting, enemata, thirst, etc. It further produces in many a very fair imitation of the symptoms of infection, as high pulse, tympanites, and temperature from retention-poisoning.

If the patient has had a careful preparation it is not necessary to seek an early catharsis, but if the preparation has been insufficient, or tympanites sets in, I try to secure a movement during the second day. The patient is raised upon two pillows and is given from 4 to 6 ounces of cold Rubinat Condal water, or 120 grains of Glauber's salts in a gill of water. If the stomach be irritable she is turned on her right side before drinking the laxative, and is kept there for half an hour. The laxative will then run into the intestines. Two hours after taking this she is given a low enema of glycerin 1 ounce and soap-suds 8 ounces. The practice of actively purging all cæliotomy cases as soon as possible is irrational. It is sufficient to see that the intestinal peristalsis is established and retention-toxicosis prevented. Intestinal gases can find a ready escape, and thus the patient be made more comfortable, if a rectal tube be inserted and left in the rectum about half the time.

If there be no special contra-indications the patient may void urine, but unless she can easily do so every six hours the catheter should be used. If the patient is allowed to void urine she should not be raised upon the bedpan, as this makes the abdominal muscles tense and gives pain, but she should pass it directly into a urinal. In most cases the catheter will be required. The hour of catheterization, the quantity of urine secured, and its complete analysis should be noted. The higher the specific gravity of the urine, associated with diminished quantity, the greater the patient's danger. The most important function to be watched is that of the kidneys. Therefore, whenever possible, the specific gravity must be kept down and the quantity maintained by the

early taking of water and by saline enemata. I have found that the rational use of hydrotherapy enables my patients to excrete an average of 32 ounces of urine the first day.

The first food given is usually at the end of one day, unless early catharsis seems indicated, when food is withheld until the bowels move. A little of the expressed juice of broiled steak or chicken broth, or the white of one egg beaten up with ice and the juice of an orange, may be tried. A feeding of 2 ounces of beef juice alternating every six hours with good chicken broth will suffice for the first two days. I never give milk or kumyss or other prepared foods. On the third day toast and a little scraped beef may be allowed.

I have never insisted upon a strictly dorsal position. The patient can with perfect safety be propped a little upon the right side, thus diminishing nausea and giving her back a rest. Of course, if drainage is employed the dorsal position must be maintained. I keep all my cases of laparotomy in bed at least three weeks, and often longer, to diminish the liability to hernia.

The pulse, respiration, and temperature (rectal) should be taken every four hours and recorded. Mouth temperature is not reliable. If the patient has had a cold drink or breathes with her mouth open, the temperature is lowered, etc. Besides, tonsillitis is communicated by mouth thermometers. I consider a rectal temperature of 99.3° F. normal. If the temperature jumps up in a few hours after operation it is traumatic and causes no uneasiness, but when it begins on the second day to rapidly ascend, it is due to some complication. The pulse, temperature, and urine show more than any three factors how the case is progressing. If tympany persists, salol in 2-grain capsules every two hours will lessen it. If the pulse flags merely from weakness, strychnine in moderate doses, champagne, or a little brandy and Apollinaris will revive it. Throughout the entire treatment much comfort will come to the patient, and the case be conducted smoothly, if firmness and gentleness guide surgeon and nurses. Sick women are strikingly like sick children, and are best handled with *rapprochement* with their attendants.

If the sutures give no distress they may be left in for weeks. I have thought that their presence had a restraining influence upon the impatience of some.



## COMPLICATIONS AFTER CÆLIOTOMY

**Secondary Hæmorrhage.**—Of all the complications of intra-peritoneal operations, the three most serious and usual are secondary hæmorrhage, sepsis, and ileus. In these days of ligation in continuity rather than *en masse*, secondary hæmorrhage is not often seen. It may occur soon after the operation or as late as the third week. The bleeding may be from a vessel in the wound of incision or from a large vessel severed in the abdominal cavity. If the hæmorrhage comes from the external wound the dressings are soon saturated, and this will attract the attention of the nurse. If the bleeding be more than was expected, the dressings are at once removed and the vessel sought for. It is important to determine whether the blood comes from the abdominal incision or from the cavity. If it arises from a neglected vessel in the incision there will usually be found a subcutaneous hæmatoma, and the blood beneath the dressings will be clotted; whereas if the dressings are wet by blood which has escaped within the abdomen, this cavity must be filled to a degree of tension before the blood can be forced between the sutures, and severe shock is then present. Furthermore, the blood escaping externally is fluid, and does not readily clot. The removal of a few sutures over the hæmatoma will expose the responsible vessel. Hæmorrhage from an intra-abdominal vessel alone demands serious consideration. It usually begins shortly after the patient is returned to bed, to become most severe in a few days when the calibre of the vessel is fully established. It is seen in  $\frac{1}{2}$  per cent of all laparotomies. The problems involved in the tying of vessels cannot be debated here, and the reader is referred to the masterly work of Ballance and Edmunds on Ligation in Continuity. The symptoms of secondary hæmorrhage are plain. The patient becomes paler, the pulse rises in speed, and becomes compressible or disappears. As the brain feels the loss of nourishing blood the face becomes anxious, the pupils dilate, a cold sweat breaks out, the patient looks frightened, and soon becomes restless; occasionally severe abdominal pain occurs, with vomiting. The respiration becomes sighing, then gasping. Sub-normal temperature, due to empty capillaries, is present. As death approaches cardiac pain is severe. As soon as hæmorrhage is detected, the patient should be placed upon the operating-table in Trendelenburg's position and kept there until the operator is

ready to open the wound. This position lessens the bleeding and relieves the disagreeable symptoms due to cerebral and cardiac anæmia. While in this position a high saline enema of 2 quarts and at 110° F. is to be given. When the wound is opened under chloroform all clots are turned out, the leaking vessels secured, the peritoneal cavity filled with normal salt solution, and the abdomen closed. An intravenous infusion of from 4 to 6 pints of saline solution should be given slowly. The patient is put to bed, well covered, and surrounded by artificial heat. The best heart stimulants are brandy and strychnine given in small doses frequently repeated. Nourishment should begin as soon as the stomach will retain it.

**Sepsis after Operation.**—Whenever there is a rise in temperature after operation, it is the duty of the surgeon, if possible, to positively identify its cause. Soon after the promulgation of Lister's method of treating wounds, we believed that all temperature after operation indicated septic intoxication, but since the routine enforcement of certain rules in our hospital wards, we have discovered that very many injuries which do not break the surface produce a rise in temperature, for instance, fractures of the thigh. Hence we speak of *traumatic temperatures*. We often see such temperatures after a prolonged and difficult operation in which there has been much bruising of tissue, and even after an examination under general narcosis. A rise in temperature due to this is sudden and occurs almost immediately after the operation, but very rapidly subsides without treatment, and need give no alarm. Another form of post-operative fever is due to the retention of putrefying faecal masses in the intestines, or to the retention of blood-clots either within the uterus or the peritoneal cavity. If due to the first cause, there are present abdominal pain, tympanites, etc. If due to blood in the peritoneal cavity, such, for instance, as in ruptured ectopic gestation, the temperature rises but little unless the blood becomes infected; but some of the symptoms of peritonitis of the simple plastic type may be present, such as fixation of the organs, etc. When the escape of blood has communicated with the atmosphere, it takes on putrefactive changes, therefore we find that blood penned up in the uterus produces a disagreeable odour. All of these temperatures due to retention of putrefying or even dead material are very properly described as cases of "*retention toxicosis*." When the



temperature is, however, due to the toxins produced by the pus-causing organisms, we speak of it as *septic intoxication*. In other places the various forms of diseases causing this are discussed. It is sufficient now to describe sepsis occurring after operation. If the sepsis has resulted from a plastic operation the wound should be very carefully examined, and if evidences of infection are present the sutures in the centre of the involved area should be at once removed and the edges of the wound separated sufficiently to allow of irrigation of the wound. It may be the infection will be about one suture only, but sufficient sutures must be removed to enable the operator to wash out the wound and apply his dressing, even if all must be removed. A dressing which was devised by the late Professor Van Arsdale has no equal. For instance, assuming the infection to be in the surface of the wound of laparotomy—and most of them are between the skin and fascia—enough sutures are removed to expose the involved lips, and after all pus is washed out and the edges of the wound irrigated with normal salt solution, the wound is thoroughly dried. Into such a cavity gauze soaked in a mixture of balsam of Peru 1 part and castor oil 8 parts is introduced, and the whole covered with rubber tissue. This dressing should be renewed every day. Bacteriological examinations of many thousands of cases have shown that even the most virulent types of streptococcic infection have been controlled by this simple method of treatment. If the infection is in the cervix after an amputation, all sutures should be ripped out and the surface painted with pure carbolic acid and the vagina packed with a strong iodoform gauze. If after perinaorrhaphy the wound becomes infected, sufficient stitches must be removed to allow of irrigation. In short, surface infections are to be treated by evacuation and drainage, and the application of such sterilizing preparations as have been found appropriate to the location in which the infection has taken place.

*Septic peritonitis* occurring after laparotomy is one of the gravest of complications. It may come on within twelve hours after the simplest operation, but usually manifests itself after the first day. The virulence of an attack depends not only upon the amount of the infecting agent introduced, but also upon the degree of trauma inflicted and the general condition of the patient. One marked distinction between the true sepsis and the other fever-producing conditions is in the rapidity of the pulse accom-

panying sepsis. Taking a septic case in which the symptoms rapidly supervene, we find that the patient having been returned to bed in an excellent condition with a pulse less than 100 and a temperature of 100.2° F., does not rally as she should. The operator knowing every detail of his operation and thoroughly conversant with the patient's general condition before the operation, is surprised to find the temperature and pulse speedily rise, so that perhaps in twelve hours after the first disagreeable symptoms the patient will present the following appearance: temperature, 103.5° F.; pulse, 140; surface of the body cold, face pinched and anxious, urine markedly decreased and reacting to the peptone test. If the blood is examined, exaggerated leucocytosis is usually present. The condition rapidly grows worse, and the patient enters a state of stupor from which vigorous stimulation and the application of artificial heat fail to rouse her. These are the cases in which a differential diagnosis from hæmorrhage cannot be made without a careful examination. If the abdomen be opened all the evidences of the most virulent form of septic infection are found in the abdominal wound and in the abdominal cavity. The patient dies because the heart and kidneys are overwhelmed by the intensity of the infection. The more usual form of post-operative infection of the peritoneal cavity comes on gradually on the second or third day, and is characterized by a progressive rise in the pulse-rate and temperature. The general symptoms presented will be in harmony with the degree of infection. Leucocytosis is usually marked. A blood examination fails to show plasmodia. There is generally a small amount of albumen in the urine and a few granular and hyaline casts are found; tympanites is usually present, and abdominal pain from the first is marked. Vaginal examination will usually reveal the presence of lymph effusion about the uterus in cases where the adnexa had been operated upon. In no class of cases can more judgment be shown than in these late cases of post-operative sepsis. When the peritonitis is due to the colon bacillus and is characterized by the effusion of lymph, the operator is warranted in adopting a policy of but when streptococci cause the peritonitis, a second operation is necessary, as a rule. The great difficulty is in identifying exact degree of infection, and I can only advise the following plan of procedure: As soon as the temperature rises, a determination that it is not due to trauma but is surely o

fectious nature, the abdominal wound should be examined. At the same time the degree of tympanites, the location of any abdominal pain that may be present, the motility or rigidity of the abdominal parietes under the respiratory movements, and the presence or absence of abdominal sensitiveness, are all noted. If the stethoscope is used, the presence or absence of intestinal peristalsis is determined, and if not found indicates peritoneal involvement. The blood should always be carefully examined, and before the administration of any drugs. A mild leucocytosis is invariably present after all capital operations, but rapidly subsides, and an increasing leucocytosis is indicative of sepsis and excludes retention-toxicosis. The blood should always be examined for plasmodia. There are no pathognomonic symptoms of any one of the conditions which produce fever after laparotomy, and I cannot lay down to the student the positive indications for performing a secondary operation. If I become convinced that the patient has septic peritonitis, it is my practice to open the posterior *cul-de-sac*, or, if this has been done before, to remove the dressings so as to examine the pelvic peritonæum. If we find pus present in the peritoneal cavity we must determine whether it is simply an increase of what existed before the operation or is due to a secondary purulent peritonitis. If the first state exists the introduction of large iodoform dressings into the pelvis will frequently suffice; but if of the second type, gauze is introduced into the *cul-de-sac* opening and secondary laparotomy is performed, during which the appendix is carefully examined, and if necessary removed, the intestines drawn out of the wound, and all the recesses about the mesentery thoroughly washed with normal salt solution, the pelvis is sponged dry, and an abdominal Mikulicz drain of iodoform gauze is inserted and the wound closed around it. In such a case the operator employs through-and-through drainage, part of which projects from the abdominal wound and part into the vagina. The general treatment of post-operative sepsis is of the utmost importance whether a secondary operation be performed or not. Inasmuch as one of the causes of death from this condition is nephritis, the patient should be encouraged to drink large quantities of water, saline enemata of 8-ounce quantities should be given every four hours, and, if necessary, intravenous effusion employed. The prognosis will depend upon many factors, chief of which is the extent of the infection. Other



conditions being equal, the less the area of peritonæum involved the better the prognosis. When the greater portion of the *cavum magnum* is the seat of infection there is but little hope for the patient. When general septic peritonitis exists recovery is impossible. By general peritonitis is meant a degree of infection which involves the lesser as well as the greater peritoneal pouch. Contrary to the usual practice of surgeons, I am opposed to the administration of large doses of strychnine in this condition. Sepsis produces contraction of the arterioles not only of the surface but of the viscera. I give small doses of strychnine and frequent small doses of nitroglycerin. The administration of nitroglycerin in these cases relaxes the peripheral vessels, thereby allowing fresh blood to the poisoned heart muscle and at the same time promoting kidney activity. I also administer brandy in 4 parts of water very frequently, giving the patient as much as  $\frac{1}{2}$  an ounce every two hours. Opium is absolutely contra-indicated except to ease the pangs of impending death.

**Ileus.**—This term is used to designate a paralysis of a greater or less length of the small intestine due to adhesions forming after operation. It is seen to follow both laparotomy and vaginal hysterectomy, but is more frequent after the former. A knuckle of small intestine either forms a volvulus or becomes strangulated over a false band or, as stated, becomes adherent. When either happens the peristalsis of a large loop of the gut is interfered with, retention of its contents takes place, and these putrefy, causing gaseous distention of the involved loop. As distention increases the paralysis of the bowel increases. When complete stasis occurs reversed peristalsis in the bowel above follows. The condition probably begins shortly after the operation, but the symptoms supervene slowly.

There is generally a colicky pain radiating about the umbilicus. This is so severe as often to produce slight shock.

It will also be observed that little or no fæces have been passed, or that only the colon has been emptied. Vomiting soon sets in. Liquids and food may be retained for hours, and then the entire contents of the stomach be suddenly ejected. The abdomen rapidly swells and becomes uniformly sensitive. As the case progresses the matter vomited will be bile-stained, then stercoraceous. Faulty preliminary preparation of the patient, combined with post-operative administration of morphine, conduces to ileus. If mor-



phine has not been given, thus masking the symptoms, the occurrence of stercoraceous vomiting is pathognomonic of intestinal paralysis either due to adhesions, strangulation, or volvulus. The patient, unable to retain fluids and nourishment, rapidly loses ground, her face becomes ghastly, a cold, clammy sweat bathes the body, the pulse gets weaker, and death ensues either as the result of starvation, or gangrene of the gut, or septic peritonitis.

Ileus is diagnosticated with difficulty in its beginning, and is confused with sepsis, which it much resembles. In ileus the progress is slower than in sepsis, the temperature does not rise so rapidly nor the pulse quicken to the extent seen in sepsis. There is at first little or no leucocytosis in ileus, while this is marked in sepsis. In ileus vomiting is an early and prominent symptom; not so in the beginning of sepsis. Tympanites very soon sets in in ileus, later in sepsis. In sepsis the shock is marked within a few hours, but in ileus does not occur for some days.

So soon as the diagnosis is made, and the sooner the better, the cause of the condition must be removed. This, as a rule, is the formation of a broad band of union between a knuckle of the small intestine and the pelvis. If a vaginal section has been performed, the involved bowel is readily released under a few whiffs of chloroform, but if the lesion follows laparotomy the wound must be opened and the gut released. On no account should the surgeon try to force a stool by giving drastic purges. If the first few doses of saline cathartic are rejected, further through-and-through purgation is not to be attempted, the lower bowel merely being kept empty by an occasional high enema. Certain cases will get well without operative interference, and these are the ones in which the band of union is slight. But it is impossible to determine exactly what cases will survive without operation. My own practice is to wait for reversed peristalsis accompanied by the vomiting of stercoraceous matter. Before this occurs the stomach should be kept absolutely empty and the necessary nourishment and liquids given by the rectum. At the same time the patient should be given moderate doses of strychnine hypodermically to improve the tone of the intestinal walls. I have thus sustained a patient for eleven days without a particle of water or food being taken by the mouth, and found that the symptoms gradually subsided.

After operating for ileus the bowels should be allowed to rest for several days and the normal peristalsis gradually return rather than excite them by purgatives.

An accident which has frequently occurred is *opening of the wound* and escape of the intestines from the abdominal cavity some days after laparotomy. Usually this is due to too early absorption of animal suture material, but cases are recorded where the entire line of silk sutures has pulled through upon one side. The accident occurs under the strain of prolonged vomiting. The patient at once complains of a severe pain in her abdomen and enters a state of profound shock. Upon examining the wound the coils of small intestine will be found lying outside the abdominal cavity about the edges of the incision. They should be covered with sterile dressings and the patient stimulated while the surgeons and assistants cleanse their hands. The patient is placed upon the operating-table and given chloroform. A careful inspection of the intestines and incision is then made. If there has been no production of pus about the wound the coils should be washed in warm saline solution and returned to the abdominal cavity, which is then filled with the same solution. Any shreds of tissue about the wound are to be trimmed away and the wound closed by kangaroo sutures applied in tiers. The strain upon these can be taken off by long sutures of No. 26 silver wire, which pass through all the parietal layers and appear an inch or more outside the incision. These are not twisted, but their ends are secured by split shot. But if there has been inevitable infection of the coils of intestine these should be washed and returned as before. Over them several pieces of mild iodoform gauze are inserted to act as drains, and around these the wound is closed in tiers, the external sutures being of silver wire. The iodoform gauze is arranged so as to spread out in a fan shape between the intestines and parietal peritonæum, the ends of the strips projecting above the incision and between the sutures. Necessarily the mortality from this accident is very high. It can be avoided by the use of silver wire as a suture material for the outer tier of sutures.

**Suppression of Urine.**—Suppression of urine occurs primarily from shock, and later on as the result of nephritis. The first form interests us here. The operator is informed that within a few hours after the operation the kidneys have nearly or quite

ceased to act. Urinalysis before the operation enables him to eliminate nephritis, and he knows the ureters have not been tied. The condition is due to shock to the vaso-motor nerve system, which produces spasm in the renal vessels. It is at once relieved by a hypodermic of morphine, grain  $\frac{1}{4}$ , nitroglycerin, grain  $\frac{1}{60}$ , and a hot flaxseed poultice over the loins.

**Nephritis.**—Nephritis is one of the most disagreeable complications which can occur because so difficult to overcome. The author has seen the greatest benefit from cups over the kidneys and hypodermic injections of nitroglycerin and tincture of digitalis. The colon should be flushed out by repeated high enemata of hot saline solution (enteroclysis), and in pronounced cases slow intravenous infusion is indicated. The fluid should be run into the vein very slowly, and if uræmic coma be impending venesection upon the opposite arm should be performed.

**Shock.**—Shock is the group of symptoms which present themselves after operation and which are due to hæmorrhage or injury to the important nerve centres. The pulse is small and rapid, the temperature subnormal, the surface of the body pale, and the skin bathed in cold perspiration. The patient after awakening lies apathetic, breathing shallow, face pinched, and all the senses blunted. The condition is to be corrected by the most vigorous treatment. If due to hæmorrhage, intravenous infusion is indicated. If due to the prolonged exposure or rough handling of the abdominal viscera, nitroglycerin hypodermically, with  $\frac{1}{8}$  grain of morphine and hot saline solution with 3 ounces of whisky thrown into the colon, will relieve the condition.

**Pleurisy.**—The symptoms are the same as those laid down in the text-books on general medicine. I relieve the pain by the application of blistering plaster, and administer 3 grains of iodide of potash in abundance of water every two hours for 5 doses.

**Pneumonia.**—This is generally due to the inhalation of septic germs during the narcosis. It used to be exceedingly frequent, but is much less so now owing to the care exercised in cleansing the ether cone. The symptoms are best described in the text-books on general medicine. It is nearly always a broncho-pneumonia. I treat these cases by giving 5 grains of iodide of potash every hour for 3 doses in an abundance of water, omitting it for three hours, and then giving 5 grains every hour for three hours more. In twenty-four hours the routine administration of iodide



of potash, 3 grains 3 times a day, is begun and maintained as long as the sputum is tenacious. The general treatment is such as is usually employed in these cases.

**Tonsilitis.**—The patient should be removed at least 6 feet from others in the ward, and be supplied with her own eating utensils so as not to communicate the disease. The type of tonsilitis is usually the follicular, and due to the streptococcus. I treat this by giving a gargle of tincture of iodine 1 drop to each teaspoonful, and iodide of potash  $\frac{1}{2}$  a grain to each teaspoonful, the patient gargling about 1 teaspoonful of this every half hour and swallowing alternate doses, so as to reach the posterior portions of the tonsils. This is continued for about two days, and then the patient is put on a borolyptol gargle 1 part in 8 of water.

**Conjunctivitis.**—This is usually due to the escape of ether into the eye, and frequently to the absurd habit of the narcotizer testing the reflexes by placing his dirty fingers on the conjunctiva. As soon as it is seen during the operation that ether has escaped into the eye, the lids should be held up and the eye thoroughly washed with saturated solution of boric acid. Upon returning the patient to bed iced cloths, frequently changed, should be laid upon the eye, and the eye should be washed out 4 times a day with saturated solution of boric acid. Preceding the washing a drop of weak solution of cocaine may be instilled.

### DRAINAGE AFTER CÆLIOTOMY

Drainage by means of a tube is little practised. It has been found impossible to keep the drainage track sterile, and as a result any ligatures adjacent to it, as well as contiguous structures, become infected. Besides the more remote result of drainage is the occurrence of hernia. Therefore, drainage through the abdominal wound is to be avoided if possible. The chief indications for drainage are found in those virulent forms of diffuse pelvic and abdominal infection due to streptococci. In these the infecting agent not only produces intraperitoneal lesions, but also involves the retroperitoneal structures as well. It is in just such cases that intestinal lesions are found as complications. The drain is used not only to remove noxious products, but also to isolate and sterilize the involved field. The drain should therefore be of



5-per-cent iodoform gauze. The practice of surrounding this with rubber tissue defeats one great object of employing the dressing—namely, sterilization of the affected area by disintegration of the iodoform. The gauze is applied in stout rolls long enough to touch the bottom of the cavity to be drained and to project above the skin surface of the wound. Sufficient of the dressing should be applied to meet the purposes for which it is used. It is rarely necessary to change the dressing inside a week. In removing the soiled gauze the intestines are held back by narrow retractors, and while so maintained the fresh dressing is applied. A good deal of pain is produced in the change, but narcosis is not necessary. In former years this gauze drain, or Mikulicz dressing, was much employed, but now most of the cases formerly subjected to laparotomy and drainage are successfully treated through the vagina. In five years the author has employed such abdominal drains but 4 times, all of the cases being due to streptococcus and associated with appendicitis. As a general rule, it is better, where such a complication does not exist, to thoroughly cleanse the field of operation and drain through the vagina. To generalize, the abdominal drain of gauze is employed after operations in which the area to be drained lies above the pelvic brim, while vaginal drainage is sufficient in cases in which the pelvis alone is involved.

#### INTRAVENOUS INJECTION OF NORMAL SALT SOLUTION

A seven-tenths-of-one-per-cent solution of chemically pure sodium chlorate in soft water is made. This is filtered into either a Florence flask—to be found in all drug-stores—or else into a perfectly clean agate kettle. It is then boiled ten minutes and is cooled by placing on ice. The solution is employed at a temperature of 110° F. The infusion apparatus is composed of a 12-ounce glass funnel, 8 feet of pure gum rubber tubing to fit this, and a cannula (Fig. 126). The apparatus is sterilized by boiling twenty minutes in plain water. The hand grasps the arm above

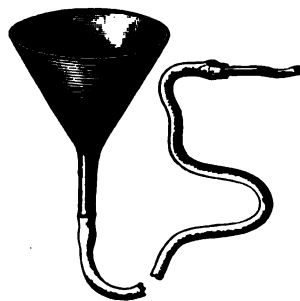


FIG. 126.—APPARATUS FOR INTRAVENOUS AND SUBCUTANEOUS INFUSION.

the elbow and compresses the veins. The median basilic vein will show running across the bend of the elbow from without in (Fig. 127). The skin is drawn upward, and is incised carefully along-side the upper border of the vein. Upon rolling the skin down



FIG. 127.—THE ANATOMY AT THE BEND OF THE ELBOW (Quain).

*a, a', a''*, internal cutaneous nerve; *b, b'*, external cutaneous nerve; *1*, the brachial artery and its venæ comites (*2*), seen through an opening which has been made in the deep fascia of the arm, and which is never opened in infusion; *3*, basilic vein; *3', 3''*, ulnar veins; *4*, cephalic vein; *4', 4''*, radial vein; *5, 5'*, median vein; *6*, median-basilic vein, into which the infusion is made.

into position the cut is found to be over the vein. The vein is carefully dissected out of its bed. The distal or outer end of the vein is grasped across with an artery forceps, and  $\frac{1}{2}$  inch internal to this the vein is caught with mouse-toothed forceps. While this is being done, an assistant whose hands are absolutely clean has filled the infusion funnel. This he holds 6 feet above the patient. The clothing in the patient's axilla has been loosened. The operator severs the vein entirely across and takes the cannula in his right hand, while holding the bleeding end of the vein with toothed forceps. The saline solution is allowed to flow against the cut end of the vein until the solution feels warm; then the cannula is inserted well into the vessel. At the same time the pressure on the arm is loosed. The assistant watches the flow of water from the funnel, and warns the operator when he is to refill it, so that the operator may compress the tube and prevent entrance of air. To avoid this, all the water is not allowed to flow from the funnel before refilling. The speed of flow is about 6 ounces in three minutes, or about a quart in a quarter of an hour. THE WEAKER THE HEART'S AC-

TION THE SLOWER THE CURRENT OF FLUID INTRODUCED, and as the arterial tension increases the speed of the infused fluid may be increased. After the operator has introduced the desired amount of fluid, the cannula is withdrawn and pressure made around the arm. It will be noted that as the patient reacts the cheeks flush and the

skin becomes bathed in perspiration. After sufficient fluid has been introduced the two ends of the vein are secured by fine catgut, and the wound stitched by the same material. The quantity employed will vary with the necessities of the case from 1 to 3 quarts, the larger quantity being required in cases of hæmorrhage and sepsis. The operation may be done under cocaine. Iodoform-gauze dressing is used.

The author has observed the following immediate effect of intravenous infusion: the temperature rapidly falls if it has been high, and the pulse has been seen to come from 160 to 110 even during the operation. In other words, it is a positive remedy for shock. Remotely, the amount of urine is greatly increased, the specific gravity falls, owing to the dilution, but the actual amount of urea excreted is increased, and albumen, if present, is either markedly diminished or disappears altogether. The procedure is thus particularly applicable to cases of septicæmia and hæmorrhage. After operation it is demanded whenever the kidneys exhibit evidences of marked nephritis.

**Subcutaneous Injection.**—*Hypodermoclysis.*—The material is prepared as before. Opposite the angle of the scapula and over the margin of the latissimus dorsi muscle the skin is cleansed. A few drops of cocaine solution are injected, or the skin is frozen with a stick of ice dipped in salt. It is incised for  $\frac{1}{4}$  of an inch. While the edges are held apart the solution is allowed to flow through the cannula until warm, and the cannula is plunged into the cellular tissue between the skin and muscle. Ten ounces of fluid are allowed to enter, when the cannula is withdrawn and a stitch of catgut used to unite the surfaces. Iodoform-gauze dressing is used. Upon the other side a similar injection is made. As the fluid enters the cellular tissue a large swelling appears which subsides in a few minutes. The injection may be repeated lower down in eight hours. I have made 3 such injections in twenty-four hours in a desperate case of sepsis—altogether 60 ounces. If the fluid is sterile and careful cleansing of the skin and apparatus has been made there is little danger of suppuration following. In septicæmic cases, however, suppuration often occurs at the point of hypodermoclysis. As the conditions for which infusion is performed are accompanied by contraction of the arterioles and capillaries, fluid beneath the skin is taken up but slowly. Therefore, intravenous infusion is more rapid and positive than subcutaneous injection.

## CHAPTER XVII

### *HYSTERECTOMY FOR PELVIC SUPPURATION*

**Abdominal Panhysterectomy, Abdominal Ablation, Etc.**—I have stated my belief that whenever both sets of adnexa are found involved their removal alone will not cure the patient, for the uterus will be left in a distinctly pathological condition and may give much trouble subsequently. But if the patient is young and even one ovary be normal, the uterus may be left with the sound ovary. In such a case the extraneous circumstance of youth modifies the surgical indications. BUT AS A GENERAL PROPOSITION, THE REMOVAL OF THE UTERUS IS INDICATED WHENEVER BOTH TUBES AND OVARIES ARE TO BE SACRIFICED. It is easier to remove the uterus completely with its adnexa than to dig these out and properly treat their stumps. Furthermore, the vascular supply is more readily controlled if the uterus is removed. Finally, so extensive are the adhesions in bilateral adnexal disease that drainage is often indicated. If the uterus is removed the drainage is through the vagina. The operation is particularly indicated in streptococcus infection where the subperitoneal structure, as well as the uterus and adnexa, is involved. In such cases drainage is necessary, and is preferably downward through the vagina.

*The Operation.*—The abdomen is to be entered in the median line. All the intestinal coils and the omentum should be liberated from adhesions within the pelvis and gently moved to a position above the pelvic brim, where they should be kept by large isolating gauze pads. The attached fimbriated ends of both tubes are then freed and the tubes and ovaries brought up into the incision for inspection. It is highly important to expose the tops of the broad ligaments outside the tubes so that the ovarian vessels may be properly secured. These vessels are tied with medium tendon, and provisional ligatures of heavy silk are thrown around the uterine ends of the tubes so as to embrace the round ligaments,



tubes, and ovarian arteries alongside the uterus. The round ligaments are now tied at the pelvic brim. The stumps of the ovarian arteries at the pelvic brim are then severed, and this cut is carried downward through the round ligaments and some distance into the broad ligaments and towards the cervix. The uterus can now be lifted up higher, dragging with it the deeper structures about the cervix. Across the anterior face of the uterus, where the bladder joins it, an incision is made through the peritonæum, the ends of which terminate at the two cuts in the broad ligaments already made. The uterus should now be held upward as far as possible while the operator peels the bladder off the anterior face of the cervix and vagina. This manœuvre will be easily accomplished by using a gauze sponge to rub down the bladder tissues. When the operator can feel the cervix through the anterior vaginal walls he cuts into the vagina, and carries this section of the vagina laterally to the full diameter of the cervix. He next opens the posterior *cul-de-sac* by cutting down from above against his finger, which he has passed behind the cervix in the vagina. A stout hysterectomy forceps is applied upon each side close to the cervix, grasping all the tissues between the first cuts in the broad ligaments and the anterior and posterior incisions in the vagina. The points of the forceps are in the vagina. The uterus is now cut away. The forceps will now be seen to hold the cut ends of the uterine arteries. These, as well as any anastomotic trunks, are separately caught in artery forceps, and the hysterectomy forceps are removed. Each vessel is now tied. The pelvis is wiped dry and the vagina packed lightly with strips of iodoform gauze, the ends of which project just above the cut edges of the vagina. If the folds of the broad ligaments spread apart the two layers of each may be approximated by several sutures. The vault of the vagina is not closed over. The pelvis is wiped dry, and upon releasing the rectum from retaining pads it will be found to fall forward against the bladder, completely covering the gauze in the vagina. The omentum is pulled down and the abdomen closed without drainage. The vaginal drain is left in place for a week, and is then removed and renewed. The after-treatment of the vaginal wound is the same as though vaginal hysterectomy had been done.

The above is the usual and typical operation, but in rare instances the complications may be such as to compel a departure

from this. In certain cases the bilateral fixity of the organs and the density of the adhesions to important organs, as the rectum and ureters, will lead the operator to seek greater mobility by employing the procedure of *hemisection of the uterus*, which is such an aid in vaginal hysterectomy. He inserts one finger down to the bottom of Douglas's *cul-de-sac*, freeing the adnexa from the uterus only that far. Then, while holding the uterus upward, he incises the peritonæum at the vesico-uterine fold, and separates the bladder from the uterus. Each cornu of the uterus is now grasped by serrated traction forceps and handed to assistants. The operator then splits the uterus in two, more traction forceps pulling up and outward the two sides as his incision is carried downward. This cut proceeds along the median line and completely splits the uterus, entering the vagina below. One half of the cervix is now grasped and lifted up while the operator cuts it away from the vagina. After he has done this he still further lifts the cervix until he feels the pulsation of the uterine artery, or by blunt dissection has exposed it. This he grasps with forceps, and then cuts the cervix loose from the base of the broad ligament. The cervix can now be so far lifted that the arterial anastomosis alongside the uterus can be caught and tied. The operator can now dissect this half of the uterus and its adnexa away from all attachments, and without difficulty. When the ovarian vessels are reached during this upward dissection of the adnexa they are tied, and this half of the uterus, the ovary, and tube are removed. The same procedure is carried out on the other side. The vessels are secured by ligatures, the vagina packed with gauze, and the case otherwise treated as in the typical operation.

**Vaginal Hysterectomy, Vaginal Ablation.**—*The Incisions.*—Having become convinced, after making the exploratory vaginal incisions, that an ablation is necessary, the operator proceeds to spread the posterior vaginal incision from side to side. After doing this he introduces a gauze pad into the opening to catch fluids. The anterior incision is next made. To do this I introduce into the uterus my intra-uterine traction forceps, and spread it until a firm grasp is secured upon the organ.

The cervico-vesical fold is accurately determined by pushing the uterus up until the point of reflection of the vagina from the cervix is seen, and, cutting against the cervix, the latter is circled to within  $\frac{1}{8}$  of an inch of the posterior cut (Fig. 105). Thus a



narrow strip of vaginal skin is left upon each side. I do not make this anterior incision near the external os, because I wish to cut above the very dense tissues about the external os and yet leave abundance of vagina. If the dissection is made near the os, bilateral space is secured with difficulty, for the incision will be surrounded by a ring of inelastic tissue. In other words, the anterior incision should be made in vaginal tissue and not in cervical. So soon as the scissors has cut through the vaginal skin, it is closed and laid sideways upon its edge in the cut. Bearing down hard upon the cervix, the operator shoves the tissues up for a short distance, or until the looser tissues are reached. The closed scissors used in this way acts as does a periosteum elevator. After the dissection has proceeded upon the anterior face of the cervix for about  $\frac{1}{2}$  an inch, a short retractor is inserted into the wound and the bladder held up. Upon wiping the wound dry a few bands of connective tissue and muscular fibre may be noticed extending from the sides of the incision towards the centre and angle of the denudation. These are snipped with the scissors. After this all attempts to enter the anterior peritoneal pouch are made with one finger. Holding the uterus firmly with the intra-uterine traction, the operator pushes the vesico-uterine tissues up. He does this by bearing hard down upon the uterus with the index finger and literally *rubs* the bladder tissues from the uterus. This is done not with the nail but with the palmar surface of the finger. It is in this bladder dissection that the great value of the intra-uterine forceps is seen. With it the uterus can be rotated so as to differentiate the loose pericervical tissues from the uterine; and in stripping the bladder from the uterus it furnishes a most admirable point of counter-pressure. It gives the operator a fixed body to work against and not a movable one. I have rarely found it necessary to sever the peritonæum with instruments. The finger, whenever it can reach the fundus anteriorly, will easily penetrate; and in cases where the peritonæum is attached high on the uterus, it should not be blindly opened until the uterus can be pulled down after hemisection.

After entering the anterior peritoneal pouch and making the dissection as high as the finger will reach, I separate the bladder from the uterus to the sides. The anatomical fact must here be noted that the width of the bladder is greater than that of the uterus, and that the organ extends laterally upon the broad liga-

ments. The operator sticks to the middle line in entering the anterior peritoneal pouch, and makes the lateral separation by moving the finger, laid flat upon the uterus, from side to side. The uterine vessels at the sides can be felt pulsating, and the dissection should not be carried beyond their level. If the operator is rough he can easily rupture the uterine vessels. So far there has been but little bleeding. The azygos artery on the posterior vaginal wall has been severed in opening the *cul-de-sac*, and temporarily clamped if prominent. The small vessels from the uterine arteries which enter the cervix give some trouble if wounded. They anastomose freely with the vesical arteries. I do not pay attention to them until I am ready to clamp the uterines. The operation has progressed to the point where the uterus is free from its attachments to the bladder and posterior vaginal wall. I have termed this the first stage, for it is done in all cases, be the further manœuvres what they may.

In making these incisions and separating the bladder, what is the position of the ureters? At the point where the uterine artery springs from the internal iliac, the ureter lies at least  $\frac{1}{4}$  of an inch below the artery. As the artery abruptly crosses the pelvis to the side of the uterus it passes across the ureter. This point of crossing is always at least 1 inch from the normal cervix, and is where the broad ligament spreads out for its attachment to the side of the pelvis. After this the ureter and uterine artery are never in relation. The ureter sweeps in a graceful curve to the bladder and is in front of the uterine artery. The uterine artery does not curl around the ureter, as usually pictured. From the time the ureter crosses the pelvic brim it begins to sink below the internal iliac artery, and when the uterine artery is reached, the ureter is easily  $\frac{1}{4}$  of an inch below the uterine. The ureter proceeds anteriorly to the bladder, while the uterine artery crosses the pelvis to the cervix (Fig. 128). Upon separating the bladder from the uterus and lifting it up, the ureters are swung outward and farther upward; and pulling the uterus down and towards the sacrum, while lifting the bladder still further moves the uterine artery to a deeper and more posterior position. When the bladder is separated and held up and the uterus pulled down, the ureters and uterine arteries are farther apart than they were before the operation. But if the bladder is not separated and lifted, down-traction upon the uterus de-



creases the angle of divergence between the artery and ureter, and they may be made to touch for the inner half of the artery and up to  $\frac{1}{2}$  an inch of the cervix. Repeated dissections by me have

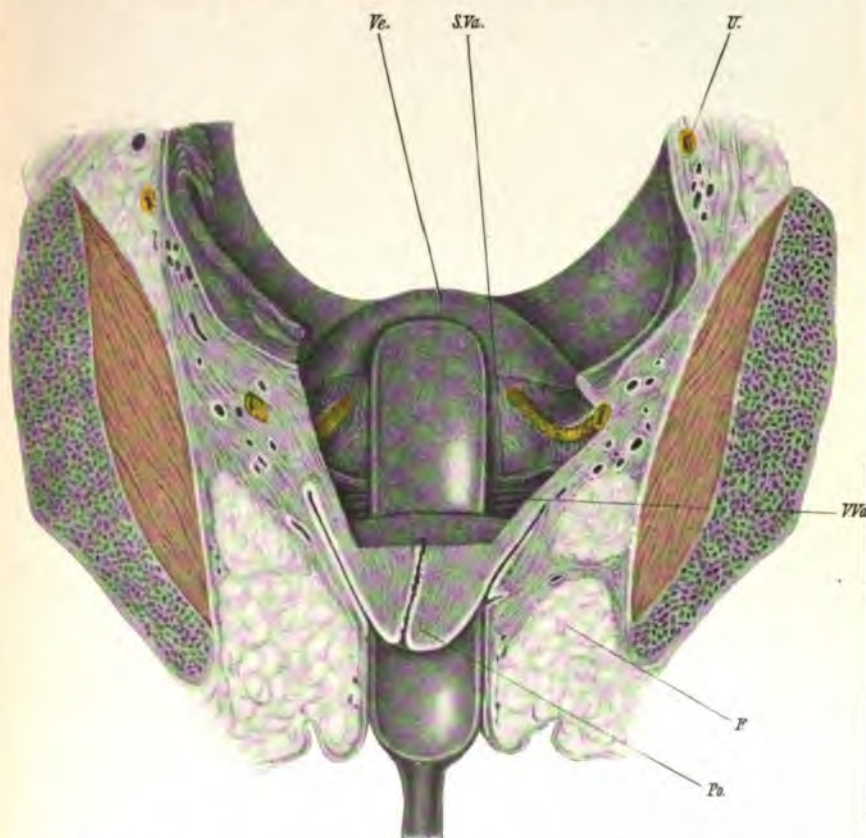


FIG. 128.—A SECTION OF THE PELVIS HAS BEEN MADE SO AS TO PASS THROUGH THE UTERUS. (Tandler and Halban.)

The body of the uterus has been cut away to show the bladder, *Ve.*, held up by the trowel; *Po.*, cervix; *F.*, ischio-rectal fat; *U.*, ureter, which is also shown yellow lower down; *V.Va.W.*, vaginal rugae; *S.Va.*, anterior vaginal wall.

shown this. The ureters cannot be wounded by any force applied at the sides of the uterus, provided such force does not tend to draw the cervix and bladder together, as, for instance, an improperly applied ligature does.

I leave a narrow strip of vaginal mucous membrane upon each

side and between my anterior and posterior incisions for two reasons: Before I apply the forceps to the uterine vessels, this strip of tissue prevents tearing off the forceps during future manipulations. Furthermore, I have thought this prevented to some extent sagging down of the vagina after completion of the process of healing, inasmuch as the vaginal vault and the bases of the broad ligaments are then one.

*In certain cases* the bladder is attached so high up on the anterior surface of the uterus that the operator cannot reach the anterior peritonæum with his finger. He should then make his dissection as high as he can, and withdraw the intra-uterine trac-

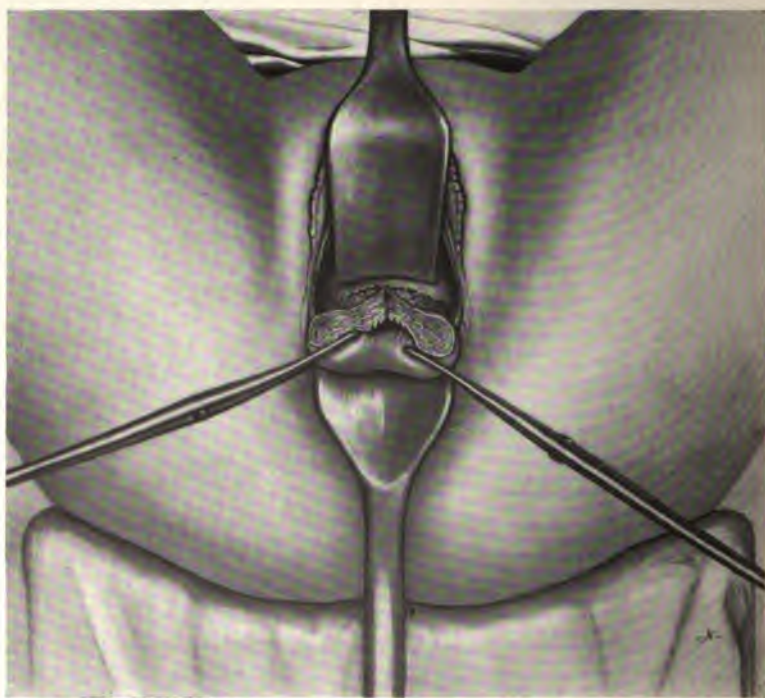


FIG. 129.—HEMISECTION OF THE UTERUS.

The cervix is shown split open.

tion forceps. In order to enter the peritonæum it is necessary for him to pull down the anterior surface of the uterus. To do this he grasps each side of the cervix with bullet forceps and splits the anterior lip of the cervix in the middle line to a little above



the level of the internal os (Fig. 127). Upon rotating the bullet forceps outward the cervical canal will flare out, and a portion of the anterior uterine wall will come down. This is cut with scissors in the middle line. While making this anterior median section of the uterus, the bladder should be held up by a narrow retractor, and as each successive portion of the anterior wall of the uterus comes into view, it is grasped by traction forceps. After a time, at the upper angle of his incision, the oper-

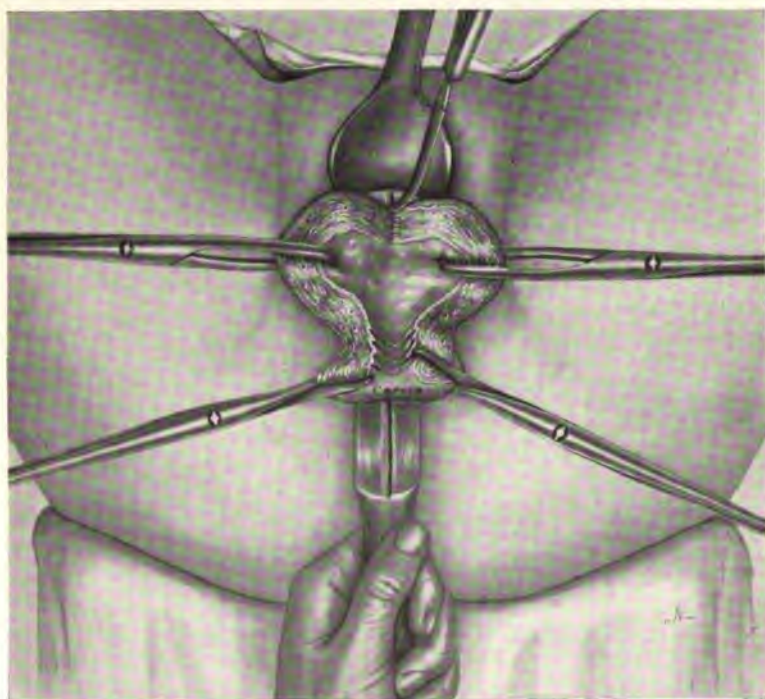


FIG. 130.—HEMISECTION OF THE UTERUS.

The anterior face of the uterus has been split. The grooved director is in place, and the knife is shown ready to complete the hemisection.

ator will see the smooth peritoneal covering of the uterus. He has, perhaps unconsciously, entered the anterior peritoneal pouch by holding up the bladder and progressively splitting the anterior face of the uterus.

*Hemisection.*—However, as a rule, the operator will experience little difficulty in entering the anterior peritoneal pouch before

splitting the uterus. This section of the anterior face of the uterus proceeds along the median line. The cervix is first split and then a portion of the body of the uterus and the upper borders of the cut are seized by the toothed traction forceps. As these are drawn upon and rotated outward, it will be found that more of the uterine body comes into view and is unfolded, so that the uterine

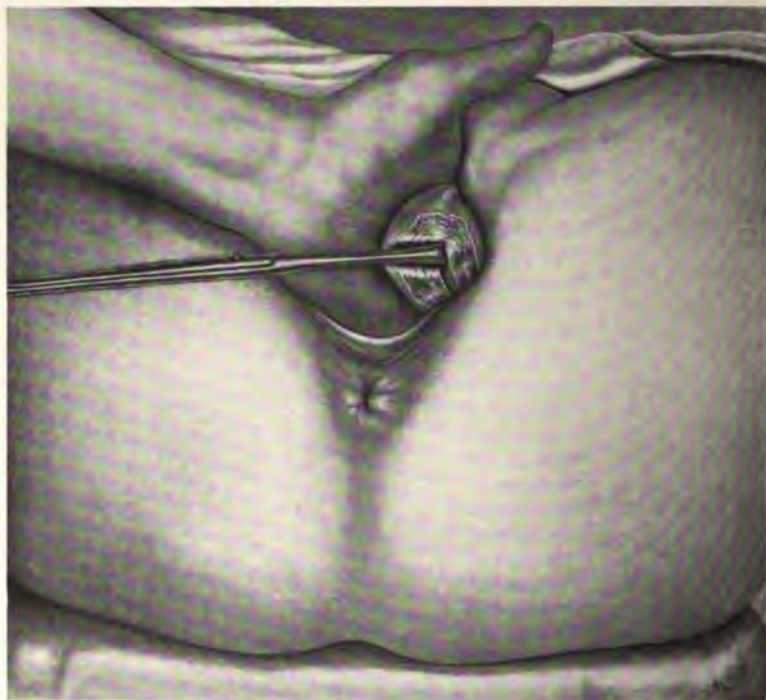


FIG. 131.—THE RIGHT HALF OF THE UTERUS HAS BEEN SHOVED UP INTO THE PELVIS WHILE THE LEFT HALF IS DRAWN DOWN.

All retractors are withdrawn, and the operator shoves his hand into the pelvis to free adhesions.

cavity is flattened out. All of the uterine cavity that can be seen is split in the middle line, and other traction forceps entered higher up. In this way the fundus is reached and severed. All specula are now withdrawn, and the grooved director is introduced behind the uterus, entering behind the cervix. A finger is inserted beneath the bladder and the director is felt; and again the finger is forced behind the uterus to see that no intestines



lie between the director and the uterus. The assistant is told to press down the perinæum hard with the director, while the curved portion of the instrument pulls forward the uterus. A short specu-



FIG. 182.—NOTE HOW THE HAND DOUBLES THE RIGHT HALF OF THE UTERUS WHILE THE THUMB HOLDS THE RIGHT ADNEXA FORWARD.

The top of the right broad ligament is shown passing between the index and middle fingers. The forceps is being applied to the right ovarian artery.

lum is inserted behind the bladder until the groove in the director is seen. Into this a special bistoury is inserted, and the uterus is split accurately in two halves. This completes the second stage.

The director is drawn out. The right (on operator's left) adnexa and right half of uterus are shoved into the pelvis, while traction is made upon the left half of the uterus. Had I not left a narrow strip of vaginal mucosa upon each side when I shoved up this half of the uterus, the uterine artery might be torn from its bed and its branches to the cervix broken. After the left half of the uterus has been turned out from beneath the bladder, it is swung to the patient's left, and all of the operator's left hand except the thumb is inserted into the pelvis. The left adnexa are readily liberated from all adhesions behind the broad ligament, as the operator can reach the pelvic brim. The operator then allows the left half of the uterus and the free adnexa to escape into the pelvis, and draws down the right half of the uterus, and liberates the right adnexa. The right adnexa are now held in front of the uterus, and the first forceps is applied to the top of the broad ligament outside the ovary. This forceps grasps the round ligament as well as the ovarian artery as it courses through the broad ligament. The tissues between the forceps and uterus are cut with scissors nearly down to the points of the forceps, and a forceps is applied from above downward so as to firmly grasp all the tissues to the side of the cervix, including the uterine artery and narrow strip of vaginal skin which was left between the incisions around the cervix. This second forceps is applied internal to the first and close to the cervix. This half of the uterus is now cut away. These forceps are allowed to hang loosely, and the left half of the uterus, with its appendages, is drawn out of the vulva. Two forceps are applied upon the left side as others were upon the right, and the remaining half of the uterus is removed.

The relation of the ureter to the cervix is greatly modified by the hemisection. In applying the forceps to the uterine artery, the cervix is drawn sharply to the opposite side. This straightens the curved portion of the uterine artery, and markedly increases the distance between the cervix and the point at which the uterine artery is in relation with the ureter. It will be noticed that no retractors are employed during this stage. They are only in the operator's way. After the uterus and adnexa have been removed, gauze pads, each secured by a stout string, are introduced into the pelvis above the forceps. The perinæum is drawn down by a long Jackson retractor, while the bladder is held up by a trowel. The table is lowered, and a careful inspection is made of



the stumps and pelvic contents. If bleeding points are seen they are grasped; but if the operator has done his work properly, four forceps are all that will be needed. The gauze pads are removed, and the pelvis is carefully cleansed by gauze swabs, particular attention being paid to the *cul-de-sac*. This completes the third stage.

A piece of iodoform gauze is inserted between the forceps and the vagina upon each side. Each set of forceps is then drawn towards the lateral pelvic wall by means of a long, narrow retractor. Between them enough strips of gauze are inserted to fill the space. These strips project up above the points of the forceps. The patient is lowered to the horizontal position, and a self-retaining catheter is introduced on a sound. The sphincter ani is dilated thoroughly. This is done to allow of the easy escape of intestinal gases and to allay spasm of the levator ani muscle. The opposing muscle to the levator ani is the sphincter. Under the bruising and stretching to which the levator is subjected, it is apt to spasmodically contract if held down hard by the undilated sphincter. Patients who have the sphincter dilated are more comfortable than are those in whom this is not done. A piece of plain gauze is wrapped around the forceps and tied. The operation is completed.



FIG. 123.—SHOWING THE METHOD OF APPLYING THE PELVIC MIKULICZ DRESSING.

The method of making these dressings is radically different from that employed elsewhere. I consider it an essential feature of my method. The Mikulicz dressing is employed here to absorb

all discharges. It should be of sufficient volume to do this during the week in which plastic union is taking place between the rectum and bladder. But there is another reason why I pack these cases so snugly. It is to avoid an accident which not infrequently happens to those who use the gauze in slender strips only. When



FIG. 134.—THE COMPLETED OPERATION.

The four forceps are shown surrounded and supported by the iodoform-gauze dressings.

the latter dressing is used, at the time the forceps are removed, the sloughing ovarian stumps very often snap back into the pelvis, causing secondary infection. The pelvic Mikulicz dressing holds these stumps immovably fixed at the vaginal vault, and I have never seen such secondary infection.

In a case of what I supposed was a secondary hæmorrhage from an ovarian vessel, when I removed the forceps on the second day I made a rapid section of the belly. There was even at this early day found firm plastic union between the bladder and rectum, and the field of my vaginal operation was found completely shut out from communication with the general pelvic cavity.

In certain cases it will be found that the uterus, even if divided, could not pass through the opening in the vault of the vagina, or it may be impossible to complete the hemisection, owing to the large size of the uterus, which fills the pelvic outlet so that the fundus cannot be reached. The uterus is then morcellated.

**Morcellation.**<sup>1</sup>—Remembering that the blood-supply

<sup>1</sup> In reading this article the one on vaginal removal of fibroid may be consulted.



rus approaches the cervical and cornual points and has lateral anastomoses between the upper and lower vessels, and that the arteries which course across the anterior and posterior surfaces of the uterus are small, the operator feels secure in severing all tissues which lie between the lateral ovarian-uterine anastomoses. The object in doing this is to so weaken the tissue in view that more can be pulled down from above by the process of decentralization, or removing the centre, thus causing a diminution in the bilateral diameter of the organ. There are two chief ways of doing this. The one most successful in dealing with large uteri associated with pus (the condition we are discussing) is to weaken the anterior uterine wall by removing successive vertical strips of tissue. Mere fixation of the uterus is no indication for morcellation; the fixation must be accompanied by marked enlargement. Typical or symmetrical morcellation is rarely possible when dealing with pus cases, the operator often combining several methods in excavating the uterine wall.

It is a great aid if the posterior *cul-de-sac* can be opened. This is first done; next the bladder is dissected from the uterus until the anterior peritoneal pouch is opened. While the bladder is held up by a Jackson speculum and the intestines protected by a gauze pad, the anterior wall of the uterus is split as high as possible. Holding the everted edges of the cut with bullet forceps, the operator trims a strip of tissue about  $\frac{1}{4}$  of an inch wide, first from one side and then from the other. Half an inch has now been taken out of the entire visible anterior uterine wall. The removal of this amount of tissue from the cervix will usually be all that can be taken away without reaching its sides. The other slices cut out will be above the cervix and from the body of the uterus. In most cases it will be found that the removal of the first two strips has so weakened the anterior uterine wall that the median splitting of the anterior wall can be continued, and the cornua uteri can be brought into view beneath the bladder. But in some cases the bladder is attached so high up upon the uterus that the dissecting finger cannot effect the separation. Then it will be necessary to split the uterus up as high as possible and remove from each side one, and perhaps two wedge-shaped pieces, with their bases upward. The stumps are firmly grasped and the anterior wall pulled farther down, while the bladder is pushed up so as to expose more of the uterine tissue. What appears is

again split in the middle line, and from each side a wedge of tissue is removed. Progressively pulling down the uterus and cutting out pieces, the cornua appear. So far there has been free capillary bleeding, but none from vessels of large size. Hæmorrhage has not yet been employed. When the cornua come into view, if necessary a large wedge is cut from the fundus, the base of which is at the top of the uterus. This piece will encroach upon the posterior surface of the uterus, and at once upon its removal the cornua with their tubes come still further into view. The grooved guide is now inserted behind the uterus and the organ split in two parts. The other steps of the operation are described under Hemisection. In reality, morcellation is not a very important factor in the removal of inflamed uteri. In fibroid extirpation it is an invaluable essential.

**Complications and Accidents.**—*Appendicitis*, with some operators, constitutes a great objection to the vaginal method. But 2 cases in 229 vaginal ablations required a secondary section for appendicitis while in my care. Many operators consider all adherent appendices diseased. I do not, any more than adherent knuckles of other parts of the gut. Perfectly normal appendices are often adherent to the diseased right adnexa. I have no difficulty in freeing them through the vagina. Intestinal adhesions are likewise loosened without damage to the walls of the gut.

I have never wounded a ureter nor had one injured in convalescence. Such accidents are not infrequent in laparotomy.

I have wounded the bladder 3 times. In 1 case only was it necessary to secondarily suture the bladder, the other 2 closing spontaneously. I have found 5 faecal fistulas at the time of operating and 1 occurred after a patient went home, caused by her carelessness. Three closed without operation, 1 by operation, and 1 failed to close after operation, the patient being syphilitic. This is not a large proportion of fistulas, for in the first report of suprapubic operations made by me of 85 cases I found 5 fistulas. Interintestinal adhesions do not result from vaginal ablation, although frequently found to cause chronic constipation after laparotomy. Hernia through the vaginal scar is not though hernia through the abdominal incision is found least 5 per cent of abdominal sections. Secondary hæmorrhage has occurred 5 times. When it does occur it can usually be controlled by the vagina, though before I found this out I 3 t



a secondary laparotomy, in a fibroid case once, in a pus case twice. Of these secondary operations 2 were unnecessary but taught me much regarding the distribution of the pelvic contents after vaginal ablation.

Kelly found that 0.44 per cent of his laparotomies had secondary hæmorrhage requiring supplemental abdominal sections. I find that in my 229 cases of vaginal ablation I have had 3 secondary hæmorrhages requiring supplemental abdominal section, or  $1\frac{1}{3}$  per cent.

I have lost no case from post-operative pneumonia or from nephritis. Slight iodoform intoxication has occurred 4 times, but soon passed off without deleterious effects. I have had no case of sudden death due to cerebral lesions. With two exceptions the convalescence of the cases has been smooth, and I have seen no evidence of that "late infection" which gives the European surgeons a considerable mortality. I have lost 1 case in 229 operations—a mortality of 0.4 per cent.

Ségonc has reported several cases of acute decubitus, but so far I have not encountered it. Mild phlebitis has occurred 3 times only, a small percentage when we consider the gravity of many of the cases and the frequency of this complication after abdominal hysterectomy. Once I operated late after a puerperal infection, in which a left broad-ligament abscess had formed, and I was compelled to open a secondary abscess above Poupart's ligament. Not the least attractive feature of this operation is its simplicity and the rapidity with which it can be performed under an incomplete narcosis. It is not necessary to secure that absolute muscular relaxation which is an essential of laparotomy.

#### RELATIVE MERITS OF ABDOMINAL AND VAGINAL HYSTERECTOMY IN PUS CASES

In view of the confusion which exists in the minds of most students of gynæcology regarding the relative merits of vaginal and abdominal ablation and pelvic inflammations, I deem it advisable to state my reasons in preferring in most cases the former, and to indicate in what class of cases the abdominal operation is to be selected.

The *incision* in the vaginal operation severs two anatomical layers only, whereas in the abdominal operation the skin, fat, fascia, muscle, and peritonæum are cut. Rarely in vaginal hys-

terectomy is it necessary to apply ligatures to spouting arteries, while in laparotomy very frequently many ligatures are necessary to control the bleeding made by the incision. Both operations necessitate separation of the uterus from the bladder; but in accomplishing this the advantage is markedly with the vaginal operation, because then the operator has the cervix as a guide, and has under perfect command that portion of the uterus to which the bladder is attached. In the vaginal operation the uterus is not masked by the viscera, which always lie in the way in laparotomy. It is not necessary to sever the perinæum to enlarge the vaginal outlet; but were I obliged to do so in removing the uterus, I should abandon the vaginal operation as carrying with it, under those circumstances, a traumatism equal to that accompanying laparotomy.

*In separating adhesions* in laparotomy it is often necessary to work through a mass of matted intestines before the organs to be removed are seen, while in vaginal hysterectomy all the work proceeds below the abdominal complications which lie above the uterus. This is a most valuable attribute of the vaginal operation, and may be somewhat further discussed. We have two kinds of adhesions to deal with: those between the abdominal viscera and those between the inflamed organs and the abdominal viscera. In vaginal hysterectomy the interintestinal adhesions are not interfered with. Some have stated that it is necessary to sever these in order to give the patient as good a result from the operation as possible, but it is my observation that even though the adherent knuckles of intestine are liberated, they can form a union more firm and more general than at first existed. But in freeing adherent knuckles of intestine in laparotomy, great tears are not infrequently made in the intestinal walls, which often require suture. Again, the manœuvres employed to liberate adherent intestines rub off the endothelium, and in these pus cases such raw surfaces become infected, to form additional adhesions. Neither statement is applicable to the discussion of the vaginal operation. In this procedure the organs to be removed are fully freed from all attachments above, and the raw surfaces created remain turned down, where provision is made for drainage, and are not dragged up, as in laparotomy, above the pelvic brim, to carry the infection to tissues not previously involved. Furthermore, in this operation all those complications



isted above the uterus are not disturbed as the operation proceeds beneath the matted mass of viscera which lies above the uterus. In laparotomy very often a tedious grave surgical operation is done before the organs to be removed are seen; whereas in vaginal hysterectomy the diseased organs are most often removed without the operator seeing a single knuckle of small intestine.

*The direction of effort* in laparotomy proceeds through an incision, which it is expected shall heal by first intention, and through a mass of adherent viscera. The infected organs are dragged up between the raw surfaces left after separating the adherent intestines and between the margins of the abdominal incision. The fingers, whether naked or gloved, repeatedly take the same path, and no hand which has been engaged in liberating and removing pus foci can be insured as clean. In laparotomy the organs removed are dragged from their pelvic attachments through the lower part of the abdomen. In vaginal ablation the direction of the effort is in the direction of drainage at the lowest part of the peritoneal pouch. The pelvic filth remains pelvic, and is never led into the abdomen. It does not pass by tissues which are to be sutured, and does not infect areas of intestine from which the endothelium has been removed by manipulation.

*Hæmostasis.*—In laparotomy this is by means of ligatures which must be absorbed; certainly those upon the ovarian vessels are cut short and left in. These ligatures are so frequently infected, being placed in an infected field, that they are often sources of trouble although isolated in a mass of lymph. All the problems embraced in a consideration of the choice of ligature material, its preparation and its fate, are factors when the operation is done through the abdomen. They are not considered in the vaginal operation.

*Drainage.*—In laparotomy this must sometimes be employed, particularly in cases of streptococcus infection, diffuse suppuration, and where tubo-rectal fistulas exist. As a result, the isolation of the area drained is effected by a matted mass of lymph thrown out by the intestines, and a breach is left in the abdominal scar. Besides, the pelvic filth is drained through the normal abdominal cavity, and is up-hill. In vaginal ablation the drainage is always used. It is at the lowest part of the pelvic cavity. The intestines do not become adherent to the drain or area drained; the pelvic filth remains pelvic, and drainage is down-hill.

Drainage after laparotomy, though not often used nowadays, infects the entire area adjacent to the drain from the pelvic floor to the abdominal skin. Drainage after vaginal ablation passes for not over an inch through the lowest part of the pelvic peritonæum, and most of it is through the vaginal tube, which is particularly adapted to carry off the material drained away without absorbing any. The infected drainage space after laparotomy remains for a large part an abdominal complication, and for weeks.

After vaginal ablation the drainage track is in a few hours made extraperitoneal by the union of bladder to rectum.

*Sutures.*—These are not used in vaginal ablation. So important a matter is the method by which the abdominal wound should be closed that there are about as many varieties as there are operators. Shall the wound be closed by buried catgut, buried kangaroo tendon, or buried silver wire? Shall the wound be united by suturing in tiers or through-and-through suturing, or shall the fat be left open? Shall the suture be applied as interrupted, or mattress, or continuous sutures?

*Hernia.*—The percentage of hernias after laparotomy is not known, but there are many of them. They are not known to follow the vaginal ablation by forceps. The intra-abdominal effort is almost wholly borne above the symphysis, while the vaginal vault is protected from this force by the posture of the body and the sacral promontory.

*Accidents.*—In abdominal hysterectomy the bowel must sometimes be sutured; the ureters have been cut; abdominal fistulas are known to exist, and ligatures have worked their way into the bladder. After vaginal ablation intestinal suture and resection must be exceedingly rare procedures. In the few cases in which the bladder has been wounded the rents closed without suture. Unless made by the veriest tyro, no wounded ureters are heard of and no abdominal fistulas are found.

*Narcosis and Time.*—Abdominal hysterectomy necessitates an abdominal section and a hysterectomy. Vaginal ablation is a hysterectomy only without the abdominal section. Few men perform a *finished* abdominal hysterectomy in less than three hours of an hour in pus cases. Twenty minutes only need be consumed in vaginal ablation. In order to secure relaxation abdominal muscles profound narcosis is necessary in laparotomy. With vaginal ablation the narcosis is incomplete and short



*Convalescence.*—Any man who has seen a number of similar cases treated by the two methods will decide that the ability to turn over in two days, the assumption of regular diet in four days, the regularity of the bowels from the first, the absence of nausea and vomiting, the early getting up, make the convalescence from vaginal ablation much less disagreeable than from laparotomy.

The mortality from abdominal hysterectomy in pus cases is more nearly 3 per cent than under it, and the author's mortality from vaginal operation in similar cases is  $\frac{1}{8}$  of 1 per cent.

### VAGINAL HYSTERECTOMY IN COMPLETE PROLAPSE

It was a matter of comment that after the total abdominal hysterectomy had been performed and the stumps turned down into the vagina, the vaginal scar remained held high in the pelvis after healing was complete. This was due to a union between the broad ligaments and the vaginal scar. It was but a single step to employ this fact in the treatment of complete prolapse. The uterus and adnexa should be removed *en masse* between forceps, as described. After the ablation is completed each stump is transfixed by a pedicle needle armed with medium-sized chromic tendon and tied in two placed outside the forceps. Each forceps is removed as the first knot is tied, and then the second knot is rapidly made. If the knot is tied before the forceps is loosened, the pedicle will not be sufficiently constricted. After the four stumps are secured by ligatures, 2 sutures are passed upon each side through the anterior and posterior walls of the vagina, and each is made to pass through a stump above its ligatures and as high up as the operator can reach. In this way the vagina will be drawn up and the stumps down. These ligatures are then tied, and will close the vaginal incision except a small portion in the centre into which a gauze drain is to be inserted. The lymph which forms about this drain still further tends to hold the vagina up. The dressings and after-treatment are the same as in other vaginal hysterectomies. This operation is particularly indicated in elderly women, because it can be rapidly performed under a partial narcosis and does not keep the patient in bed over ten days. It is contra-indicated in women in the childbearing period of life.

## SECONDARY HÆMORRHAGE AFTER VAGINAL HYSTERECTOMY

Whenever large vessels in the body are secured, either in continuity of tissue or *en masse*, this accident may follow, and the vaginal operation is no exception to this rule. The vessels may be perfectly secure under the forceps, and yet secondary bleeding occur any hour between the time they are removed and two weeks later. The bleeding usually springs from one uterine artery, and is readily controlled by bilateral pressure. The patient should be taken to the operating room and placed in the lithotomy posture, her buttocks close to the table's edge and knees drawn up over the abdomen. A narrow retractor is introduced through the centre of the column of gauze, and one half of the gauze—that upon the side from which the bleeding comes—pulled hard against the lateral pelvic wall. A similar retractor is entered alongside the first, and the other half of the gauze pulled to one side. When it is seen that the pressure is sufficient to stop the bleeding, the vaginal packing is increased by the introduction of additional pieces of gauze between the two retractors. The retractor which holds back the gauze over the bleeding vessel is not to be moved until the dressing is complete, but the adjustment and compression of all fresh pieces of gauze are effected by means of the opposite blade. After waiting a few minutes to see whether the bleeding is stopped, the patient is put to bed, the foot of the bed being elevated.

If the pressure does not control the hæmorrhage, the patient is placed in Sims's position and given chloroform. All dressings are removed and the bleeding vessel sought for. Descent of the intestines is prevented by gauze pads, the bladder is sharply retracted with the trowel, while the perinæum is held back by a Sims's speculum. When the spouting vessel is seen, it is grasped with bullet forceps, which take a firm hold on the tissues, and the stump is lifted away from the vaginal wall. It is then an easy matter to grasp the stump with forceps. The vagina is to be packed with iodoform gauze. If, after searching carefully, the bleeding is seen to come from above the vaginal vault and vessel cannot be found, the hæmorrhage springs from an ova artery. When the operator is convinced that this is the case does not attempt to secure the vessel through the vagina wit



ceps, nor to compress it with gauze, but, after packing the vagina with gauze, to prevent descent of the intestines, he throws the patient into Trendelenburg's position and opens the belly. When he has found the source of the bleeding, the artery is tied with chromic tendon and the stump trimmed. The same is done with the other ovarian artery. The ligatures are cut short and the pelvis cleared of clots. The abdomen is closed. It is well to give a high enema of 3 pints of salt solution before the patient leaves the table, or to inject sterile filtered normal salt solution into a median cephalic vein. I have seen this accident but twice.

If it be found that the bleeding comes from the azygos artery or other vaginal branch, it is best secured by passing a curved needle around it and tying *en masse* with silk. I cannot conceive it possible that so tortuous and long a vessel as the ovarian artery can bleed after its current has been completely shut off for two days. It is probable that it bleeds because the occlusion has been partial and incomplete, and after the removal of the forceps the blood stream bursts through whatever clot has formed in the vessel. It is not so with the uterine artery. After this vessel is clamped, but little of its length remains between the forceps and the internal iliac artery, and consequently, when the forceps is removed, the end of the artery feels the full force of the pressure from the iliac.

I cannot explain the very late hæmorrhage occasionally occurring when the patient is ready to get up, except upon the hypothesis that the repatency of the artery becomes established. That this does occur I have shown. It has been observed after abdominal hysterectomy with ligature, and has heretofore been ascribed to bleeding from anastomotic vessels. It is always from the uterine artery or its branches, and is easily checked by forceps applied through the vagina.<sup>1</sup>

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<sup>1</sup> The author demonstrated by an autopsy upon an injected cadaver who had been subjected to a vaginal ablation many years before, silk ligatures having been employed, that the uterine artery becomes patent after a time.

## CHAPTER XVIII

### *THE OPERATIVE TREATMENT OF CARCINOMA OF THE UTERUS*

THIS is of two very distinct and markedly differing kinds: those procedures which may be called radical and those which are solely palliative.

#### **INDICATIONS FOR THE SEVERAL RADICAL OPERATIONS FOR CANCER OF THE UTERUS**

**Of the Cervix Uteri.**—As a general proposition it may be stated that whenever malignant disease of the cervix is discovered and is limited to the uterine tissue a radical operation is indicated. In certain cases the general condition of the patient may be so poor that to subject her to a grave operation would be fraught with too great danger. Advanced lung disease, nephritis, and mitral disease, as a rule, contra-indicate ablation of the cancerous uterus. As a converse proposition, it may be laid down that whenever the cancer has extended beyond the uterine tissue, radical work is out of the question. Such extension reveals itself in a greater or less density in the pericervical tissues, fixity of the cervix, and, remotely, glandular enlargements. But these conditions are also brought about by inflammatory lesions, and these latter must be eliminated as causes for the fixity of the cervix before the propriety of a radical operation can be determined. THERE IS A SURGICAL RULE WITH ITS COROLLARY ALL OPERATIONS FOR CANCER SHALL PROCEED THROUGH TISSUES, AND THAT NO RADICAL OPERATION SHOULD BE AT UNLESS THE SECTION OF THE TISSUES CAN PASS OUTS CANCEROUS FIELD. For the scope of any proposed

determined not so much by the fact that this or that fraction of tissue is involved in the cancerous invasion as by the tendency of cancer to recur after removal. AND THE MERITS OF ANY OPERATION FOR THE RELIEF OF THIS CONDITION ARE DETERMINED BY THE ULTIMATE RESULTS RATHER THAN BY THE IMMEDIATE. Good ultimate results are not to be expected when the cancer has extended beyond the uterus. And furthermore, the less the involvement of the uterus itself the better the remote results following operation. Therefore, cancer which is diagnosed by the microscope is less likely to recur than that which is revealed by the symptoms it produces. So, then, the earlier cancer is diagnosed the clearer the indications for radical operation and the better the results from such operation, both immediate and remote. Even when bimanual examination demonstrates that the uterus is perfectly movable, cystoscopic examination will often show that the cervico-vesical wall is involved. This involvement will cause rounded elevations beneath the vesical mucosa.

The great problem which confronts the surgeon is the determination of the distance from the cancer field at which his section of the tissues must proceed. It may be stated that in epithelioma the tissues may be severed closer to the involved field than in adeno-carcinoma. Whether this clinical observation is due to the lesser virulence and slower progress of epithelioma or to the fact that as a rule epithelioma is usually, because of the nature of its growth, discovered sooner than adeno-carcinoma, I do not know. But it is my belief that epithelioma of the cervix is far less malignant than adeno-carcinoma. However, the rule in operating is to keep as far away from the cervix as possible. There are two routes for operating upon cancer of the cervix: the vaginal and the abdominal. And of all cases of cancer of the uterus which come to us for treatment, scarcely 10 per cent can be subjected to any radical operation.

(a) *Indications for the Radical Vaginal Operation.*—These are to be found in the immediate mortality and in the ultimate results.

The death-rate from vaginal hysterectomy in cancer of the cervix should not be more than 5 per cent. It is most difficult to determine precisely the ultimate results because so many patients are lost sight of, and the groups of cases falling in the hands of different operators vary so much in the extent of the



involvement. Of all cases operated upon by the vaginal route, about 60 per cent recur within the first year after operation. Of the remainder, not more than 20 per cent are free from recurrence after five years. And these results are found by those who are thorough masters of technique.

Vaginal hysterectomy for cancer of the cervix is an operation which can be rapidly performed and does not necessitate a profound degree of narcosis. It is therefore indicated in those who are aged and who would not for other reasons stand a more severe and prolonged operation. If it is indicated at all, it is in old women, in very stout women, and those with nephritis or cardiac

disease, who are suffering from epithelioma. It is the author's belief that a less severe operation gives results equally good remotely and far better immediately. I refer to the high amputation of Dr. John Byrne. And when we reflect that the radical vaginal operation is limited to cervical cancers which have not extended beyond the uterus, while the procedure of Byrne is applicable, and always with benefit, to all cases which have not actually invaded the bladder or bowel, we can see the greater value of Byrne's operation.

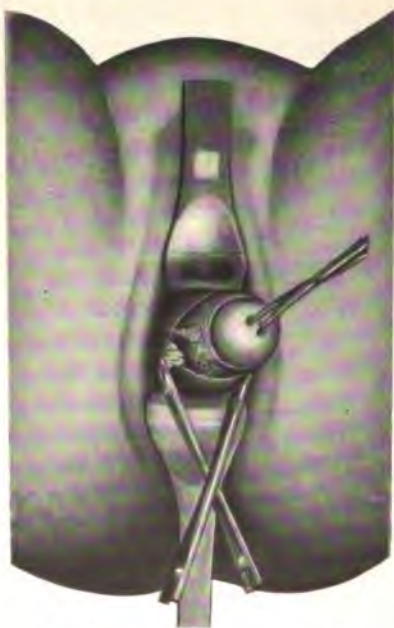


FIG. 135.—ABLATION EN MASSE.

The forceps are shown grasping the bases of the broad ligaments upon both sides, and the tissues have been cut so as to free the cervix upon all sides.

*The Operation.*—The patient is placed on the back in the lithotomy posture. All necrotic and cancerous tissue about the cervix should be scraped and cut away. The cervix is then closed by a

series of heavy silk sutures. These effectually prevent soiling the wound by cancer elements and furnish excellent traction strings. The uterus must be removed *en masse*, and without hemisection



and morcellation. The cervix is now entirely circled either by the scissors or cautery knife, preferably the latter. The line of incision must be as far away from the cervix as possible: posteriorly at the lowest limit of the pouch of Douglas, laterally near the ureteral lines, and anteriorly at that point beneath the bladder which will just escape entering that viscus. Approximately this cuff of cervical tissue will not be over  $\frac{1}{4}$  of an inch in depth (Fig. 139). The posterior, anterior, and lateral vaginal walls are retracted by assistants, one of whom pulls the cervix down. The operator now carefully dissects up the vaginal cuff by means of toothed forceps and scissors. He next enters the posterior *cul-de-sac* and extends the lateral margins of this incision by his fingers until the bases of the broad ligaments are reached. Into this posterior opening a gauze pad is introduced to catch fluids and prevent prolapse of the intestines. The operator then turns his attention to separating the bladder from the uterus. This

must be accomplished slowly by means of the toothed forceps and scissors, more rapidly by using the index finger to peel up the vesical tissues (see Vaginal Hysterectomy for Pus). When the vesico-uterine fold of peritonæum has been severed the lateral borders of the anterior incision are extended by means of the fingers. The uterus now hangs by its lateral supports only. It is important to release the ureters from their associations to the loose tissue about the cervix. This is accomplished by gently showing the tissues away from the cervix first on one side, then on the other, anteriorly and posteriorly. It may be doubted

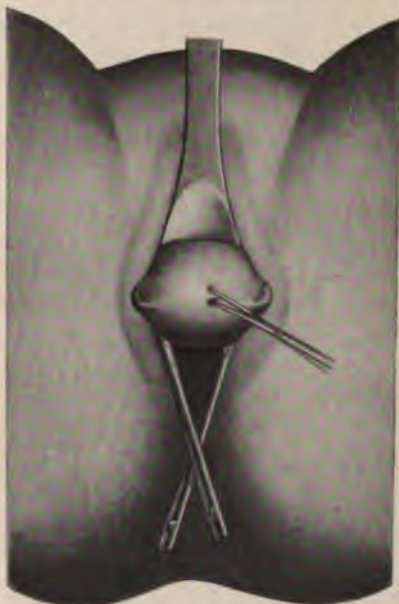


FIG. 136.—ABLATION EN MASSE.

The free cervix has been shoved up and the fundus drawn down. The bullet forceps are shown fastened into the fundus, and the cornua uteri are seen.

whether the ureters can be laterally displaced in this manner. I have many times demonstrated it upon the cadaver. This separation of cervix from ureters is still further increased by drawing down the uterus and lifting the bladder with the trowel. While this is being done one index finger is introduced behind the uterus and the tissues upon one side then upon the other are grasped by forceps. The bases of the broad ligaments upon each side are in this manner grasped, together with the uterine arteries. Before the forceps are locked they should be slowly worked outward as close to the ureters as possible and without wounding them. After locking the forceps the tissues are cut close to them up to the



FIG. 137.—*ABLATION EN MASSE.*

All retractors have been removed. The hand is shown grasping the right ovary and tube and fundus uteri. The forceps is grasping the top of the right broad ligament.

points of the forceps. These two forceps must also embrace the insertions of the utero-sacral ligaments. The uterus now hangs by the tops of the broad ligaments and the round ligaments. In order that these may be secured without risk of wounding the gut, the cervix is released and the body of the uterus delivered beneath the bladder. The ovaries are drawn out also and held by suitable forceps. A forceps is then applied from above downward upon the right side outside the ovary, with its points lapping the forceps below and internal to it. The broad ligament and round ligament are cut and the uterus swings out of the pelvis. It is an easy matter now to grasp the ovarian artery

on the left side and remove the uterus. If the operator prefers to do so he may now substitute ligatures of stout tendon for the forceps. These ligatures are passed by the large aneurysm needle first to the bases of the broad ligaments and then to the tops. I always



ligate the round ligaments separately to guard against their pulling out of the loop of the ligature, thus loosening it and causing secondary hæmorrhage. Care must be exercised in removing the forceps lest the stumps slip away from the operator. He should attach a fine artery forceps to the cut end of the artery, and then, as an assistant loosens the large forceps, the operator ties down hard and makes the second knot as rapidly as possible before the elasticity of the stump loosens the first knot. My individual preference is for the use of the forceps exclusively. If this is done, the wound is dressed as in the similar operation for pus. If ligatures are used these are cut short and the stumps allowed to retract upward. The centre of the wound is then closed by several sutures of tendon which unite the anterior and posterior cut edges of the vagina. Intra-abdominal pressure will force the peritoneal edges together. A snug drain of iodoform gauze is inserted upon each side up to the stumps of the uterine arteries so as to prevent prolapse of the intestines or omentum, and the vagina is loosely packed with iodoform gauze. If ligatures are used the stumps do not slough, while forceps, if left on, always cause slough. It is because of this effect of forceps that I always use them. With ligatures the stumps remain vitalized, while with forceps they come away. Therefore forceps remove more tissue than the ligatures, and broad removal of tissue is what we desire when operating for cancer. The dressings are removed and renewed in seven days.

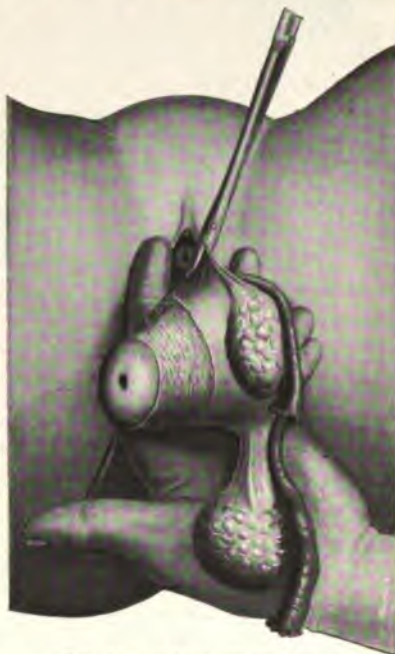


FIG. 138.—ABLATION EN MASSE.

The uterus swings out of the body when the right broad ligament is severed. The last forceps is shown grasping the top of the left broad ligament.

(b) *Indications for Abdominal Ablation of the Cancerous Uterus.*—Inasmuch as the abdominal operation allows the operator to secure the ovarian vessels at the pelvic brim and the uterine arteries outside the ureters—as by this operation not only the in-

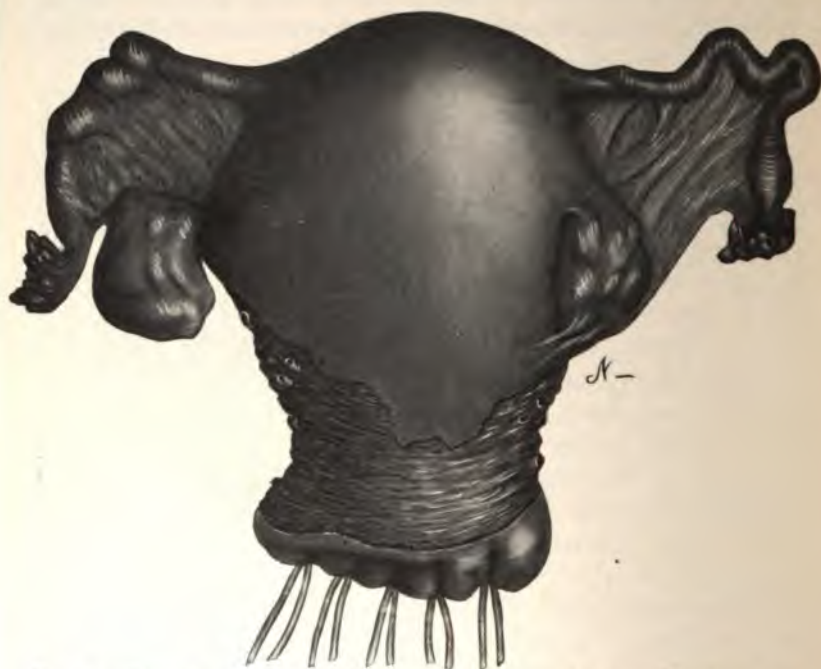


FIG. 139.—SPECIMEN REMOVED EN MASSE BY THE VAGINA IN EARLY CANCER OF THE CERVIX.

dividual lymph glands, but the lymph channels in the broad ligaments can be removed, as well as all the vagina, if necessary—I always perform this operation for cancer of the cervix if a radical operation is indicated. The operation permits the broadest section of tissue in an uninvolved field with accurate removal of lymphatics, thus complying with the first surgical requisite. It further admits of this being done under a preliminary hæmorrhage, and the vessels and lymphatics are severed before the uterus is subjected to any squeezing, thus eliminating the possibility of extrusion of the cancer elements into the absorbents. Furthermore, complications can be better dealt with by this route. The abdominal route permits the surgeon to remove all those struc-



tures to which cancer normally extends and in which it has a tendency to recur. And it does this to the satisfaction of every requisite of the surgical treatment of cancer. In some quarters there is a tendency to apply the vaginal operation to the early cases, reserving for the abdominal operation those in which there are complications or in which extension of the cancer outside of the cervix has taken place. If cancer were free from the tendency to recur, such a selection might be proper, but by adopting such tactics the operator is neither just to the operation nor to his patient. If the abdominal operation is the preferable procedure for, and grants any sort of protection to those who have cancer with complications, it is indicated with still greater insistence in the early cases. No one has the right to rob a patient suffering from cancer of even a fraction of a per cent of immunity from recurrence. In all cases it is the surgeon's duty to do the most radical operation possible provided this complies with the surgical and anatomical requirements of the case and does not carry a prohibitive mortality. A woman with early cancer has greater right to a radical operation than one with the disease in a later stage, for her chances of recovery and immunity against recurrence are greater.

The operation has been before the profession for too short a time to justly estimate the ultimate results. It has been performed by me 34 times with 3 deaths, 8 $\frac{8}{10}$  per cent mortality. In no case in which the parametrium was not already involved has there been recurrence in a year. The first operation was done five years ago, and the patient is still alive, free from recurrence. The causes of death were angina pectoris due to arteriosclerosis, nephritis, and endarteritis obliterans, each 1 case. An extended report will be made at a future date. Enough has been said here to furnish reasons for the procedure.

*The Operation.—The Vaginal Stage.*—The uterus is curetted and all cancerous spots are cut away. The cervix is then thoroughly roasted with the dome-shaped cautery. The vagina is now cleansed, and a self-retaining catheter introduced and left open to drain the bladder. This stage has been conducted by the first assistant, who now resterilizes his hands. The patient is placed in position for laparotomy.

*The Abdominal Stage.*—A median incision is made from the pubis to the umbilicus. It is necessary to go through the pyram-

idalis muscle down to the pubic cartilage. And if the woman be fat, the umbilicus is removed and the incision extends above this. Upon entering the abdomen the table is lowered into the exaggerated Trendelenburg position. The intestines and omentum are gently taken from the pelvis and placed in the abdomen, and the sigmoid is straightened out. The curvature of the loins upon each side of the spine above the pelvic brim are carefully and accurately filled with gauze pads, and other pads are used so as to make a complete dam across the body at the upper end of the incision holding the intestines back. The table is now raised so as to be almost horizontal. A careful survey of the field is made, but rapidly. I then pick up the ovarian vessels of one side at the pelvic brim before they cross the external iliac artery and ligate them. Provisional ligatures are then applied near the ovaries. The same is done on the other side. The broad ligaments between are cut close to the first ligatures, which latter are cut short. The round ligaments are seized by artery forceps, drawn out, ligated close to the internal inguinal rings, and cut short. Beginning upon the right side the peritonæum is split upon a director from the point of first cut, along the pelvic brim below the external iliac artery to the vesico-uterine fold. This having been done on each side and the two cuts united by a third across the bladder at the vesico-uterine fold, the peritoneal covering of the organs to be removed is severed at all points except posteriorly. Using the fingers only, I push the lower flap of peritonæum on one side, in which should be the ureter, away from the upper, feeling for the pulsation of the common iliac artery. This blunt dissection proceeds down into the pelvis until the internal iliac is found. At a point over this, about  $\frac{1}{2}$  an inch below the bifurcation of the common iliac, the internal iliac is carefully exposed. For this purpose I use toothed forceps and Sims's blunt vesico-vaginal scissors. It will be seen that the artery is accompanied by one vein, which usually lies below it, sometimes by two. The aneurysm needle is passed unthreaded around the vessel from within out. It should be threaded with a chromic tendon  $\frac{1}{16}$  of an inch in diameter, perfectly round and tested. This is drawn around the vessel. The first knot is made with one turn of the strand and tied. It should be tied slowly without lifting the artery, and by a pressure of 2 pounds so as to approximate without rupturing the intima walls. The second knot is carefully tied. If

pulsation is found below the ligature another is passed and tied. The ligatures are cut short. To one side of the bladder beneath the horizontal pubic ramus the loose areolar tissue and fat is spread apart by the fingers so as to expose the white obturator nerve. This is traced to the obturator foramen. At this point the obturator artery and veins are exposed, usually below the nerve. The needle is passed around the vessels, carrying a fine tendon, and the vessels are ligatured. The variations of the obturator artery must be borne in mind at this stage. The ligations are repeated upon the other side. These eight preliminary ligations have cut off all blood supply through the ovarian, round ligament, uterine, superior vesical, pubic, obturator, gluteal, and sciatic arteries, and sometimes through the ileo-lumbar. The field of operation will be bloodless except from severed veins and anastomoses low down in the pelvis. I next dissect out the ureters to the point where they pass beneath the uterine arteries, ligate these arteries at their origins from the internal iliacs as a precaution, and trace the ureters forward well up to their insertion into the bladder. All fat in the obturator foramina about the upper third of the vagina and between the iliac vessels, together with all glands which are visible, are now removed. Particular attention is paid to the bases of the broad ligaments and obturator foramina, to remove all lymphatics and glands. While the ureters are held up, the operator dissects the bladder from the uterus and upper half of the vagina. In freeing the ureters they should be dissected entirely away from the peritoneal flaps, otherwise much fat will be left clinging to them. I usually at this stage ligate, as a precaution, the superior vesical and other anterior branches of the internal iliac close to the main artery. The uterus is now held high up so as to put the vagina and utero-sacral ligaments on the stretch, and the vagina and utero-sacral ligaments, with their peritoneal covering, are circled by the scissors below the upper third of the vagina. Deep down in the pelvis the erectile tissue of the vagina will be found bleeding. This is grasped and ligated. All loose bits of fat above the bases of the broad ligaments, between the iliac arteries and between the severed utero-sacral ligaments, are picked out. If the venous bleeding is troublesome the patient may be lowered into Trendelenburg's position while the operation is finished. The vagina is held open by two forceps and several rolls of gauze are introduced, their ends

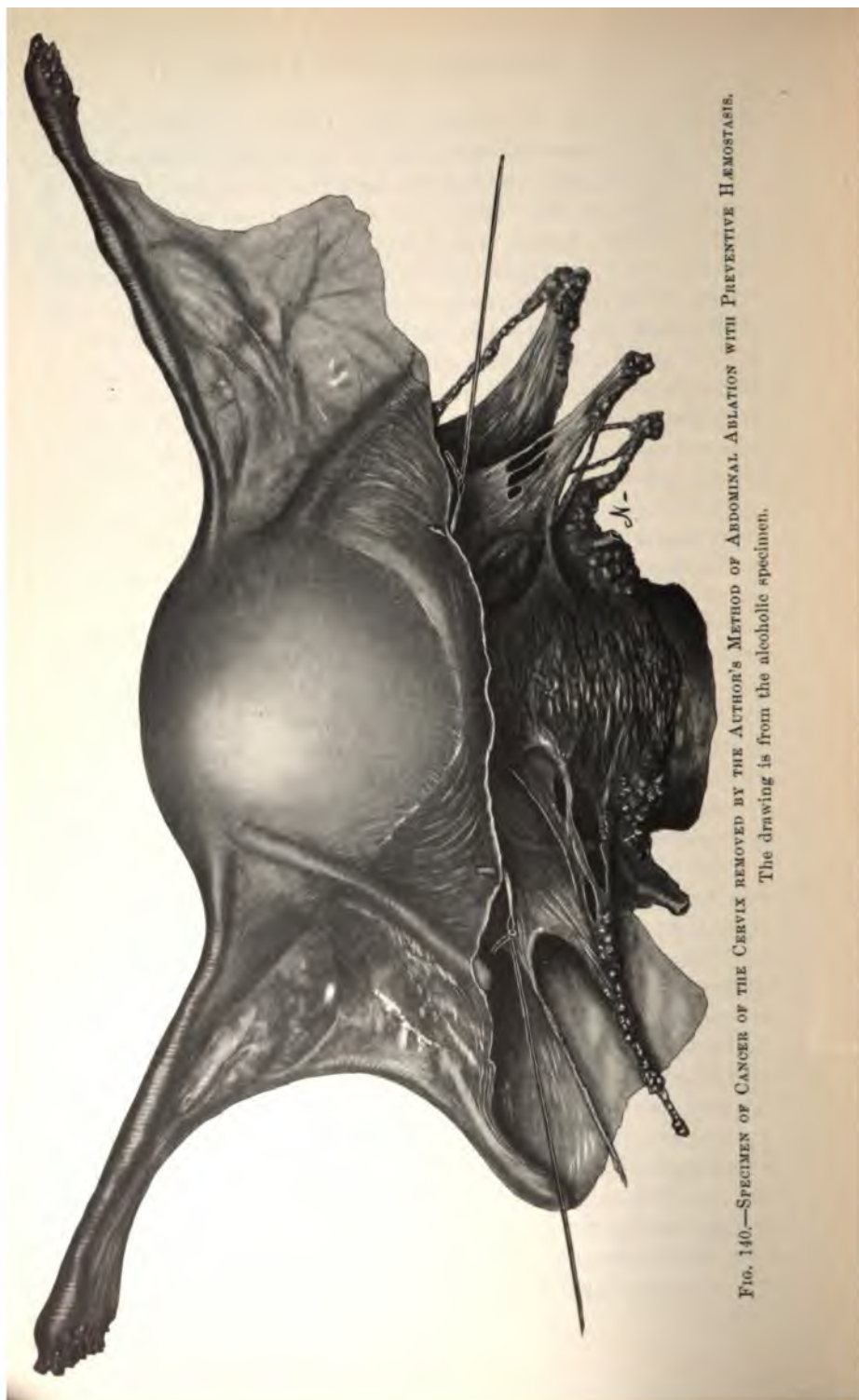


FIG. 140.—SPECIMEN OF CANCER OF THE CERVIX REMOVED BY THE AUTHOR'S METHOD OF ABDOMINAL ABLATION WITH PREVENTIVE HEMOSTASIS.  
The drawing is from the alcoholic specimen.



projecting above the vagina. The ureters are returned to their beds and the peritoneal flaps adjusted by interrupted sutures as far as possible. Upon each side a suture should pass through the round ligament, which is stout, and then through the fold of peritonæum at the sides of the rectum. It is unnecessary to suture the rectum to the bladder, as they will fall together.

The field of operation having been closed out, the retaining pads are removed, the sigmoid and omentum brought down, and the abdominal wound closed. The wound is dressed and the patient placed in the lithotomy position. The vaginal dressings are examined and adjusted. In doing this the livid hue of the vulva and buttocks will be noticed, due to the ligation of the internal iliacs. The patient is given a high enema of 1 quart of warm saline solution containing 2 ounces of whisky. This is done by dropping the head of the table and not by inserting a long rectal tube. If shock is present it is to be treated as detailed elsewhere. The vaginal dressings are removed and renewed in ten days.

### HIGH AMPUTATION

*Indications.*—In the author's opinion, the few cases which cannot stand the strain of the perfected abdominal operation will receive a better ultimate result with less immediate risk from the operation under discussion than from vaginal hysterectomy. It has been shown that cancer of the cervix has little tendency to ascend above the internal os. It is, therefore, in operating for cancer of the cervix, not necessary to proceed above the internal os. THE TRUE INDICATION IS FOR A REMOVAL OF THE UPPER THIRD OF THE VAGINA AND THE PARAMETRIC TISSUE AND GLANDS OUTSIDE THE URETER. This is accomplished only by laparotomy, never by vaginal hysterectomy. Vaginal hysterectomy may then be termed an operation of purely local application, such as is amputation of the mamma without muscular and glandular extirpation. It will be seen how thorough the high amputation and cautery is.

*The Operation.*—The patient may be in either the lithotomy or Sims position. I prefer the former. Wooden retractors are preferable. If metal are used they must be frequently cooled by iced water. The uterus is curetted and the cervix amputated by Sims's method. The diverging tenaculum is then introduced into

## GYNÆCOLOGY

the uterine canal and the excavated stump drawn down. A sharp-pointed knife, curved on the flat, is inserted into the tissues, and a hollowed cone of tissue is removed. The tenaculum is again introduced and another cone removed. This is repeated until the uterus is excavated, so that upon digital examination



FIG. 141.—FIRST STEP IN HIGH AMPUTATION OF CERVIX—MAKING THE CIRCULAR INCISION (SAGITTAL SECTION). (Byrne.)

nothing remains of the cervix but a thin shell of tissue. The cavity resulting leads by a broad opening into the uterine cavity, and there should be no constriction at the former site of the internal os. The wound made by the successive applications of the knife should open downward as a cone with a broad base.

The operator now inserts the dome-shaped electrode *cold* to the fundus uteri and turns on the current sufficiently to heat the knife white.

It is held in one position until all bleeding stops and the adjacent tissues are charred black. This takes about fifteen minutes. The heat radiates in all directions, and while being applied frequent applications of gauze wrung out in iced water are to be made to the vaginal retractors. The staff of the cautery must, of course, not be allowed to touch the retractors. After cooking the corpus uteri the current is turned off and the withdrawn to the cervix. If it is found to be caught cause the cervix has not been properly excavated by The cautery is now held within the cervical excavation current turned on. Not only should the heat convert the remains of the cervix into a carbonized mass, but the

assumed by the adjacent vagina shows that it, too, is destroyed. As the cervical cavity has been thinned out, less time is required to destroy it than in the case of the corpus. In fact, the corpus is so thick that the area of carbonized tissue protects it, and I have never seen it *all* slough away. The application of the cautery to the cervix must be most thorough. It is more often incomplete than proper. It is almost needless to say that the heat produces a sterilized wound. It must also undoubtedly destroy the pericervical tissues for quite an area, particularly the less vitalized cancer cells.

The wound is not packed, but when discharge begins the patient is put on mild antiseptic douches. Surprisingly little pain results. Advanced cases are no bar to the operation. It has a retarding effect upon all. Instead of removing the tissues by knife and then applying the cautery, the entire operation may be performed by the cautery knife (Fig. 141), but more slowly.

**The Treatment of Advanced Carcinoma Cervicis Uteri.**—This embraces removal of all sloughy and necrotic tissue so far as possible to secure local cleanliness. During the application of the curette and scissors frequent digital examinations should be made to determine the thickness of the tissue remaining around the cavity. Should the peritoneal cavity or the rectum or bladder be entered the patient's danger is much augmented. If the peritoneal cavity is entered it should be drained, not sutured; and if the bladder or rectum be wounded suture is useless, for cancerous tissues will not unite, so the organ entered must be kept empty in the hope, usually vain, that the opening will close; in the first instance by catheter, in the latter by rectal tube. In cases where there has been no damage to any adjacent organ, after all sloughing tissue has been cut and scraped away the bleeding is to be checked by the application of the galvano-cautery. A superficial slough will be produced by this which in a few days will separate, leaving a granulating wound. Further removal of tissue can be secured by the following method of treatment: thin circular pieces of cotton about  $\frac{1}{2}$  an inch in diameter are squeezed out in aqueous solution of chloride of zinc of 20-per-cent strength. These are packed snugly all around the cervical cavity so as to completely fill it. Over the whole the vaginal vault is packed with large pieces of cotton wrung out in a saturated solution of bicarbonate of soda. This is essential, because as the serum percolates through

the zinc-laden cotton it would cauterize the vagina unless caught and neutralized by the soda solution.

The dressing is left in two days. Upon its removal the cervical cavity will be lined by a greenish slough. Two days later this can be picked away by forceps. In this way repeated sloughs can be produced and removed. When the physician has no cautery, this caustic treatment can be begun after the operation for removal of the cancerous outcroppings as soon as the bleeding has ceased. I have tried all the various methods of local treatment and find this the simplest and most efficacious. Immediately upon the completion of this treatment the patient should be put on thyroid extract. I have seen in many cases good results follow, and in no case have I failed to see the disease arrested for a time at least. The thyroid should be pushed to the point of tolerance.<sup>1</sup>

*Pain* in carcinoma must be relieved by opiates. At first codeine suppositories are employed, then the stronger preparations.

Section of the spinal nerves I cannot recommend.

*Hæmorrhages* occurring during the course of cancer are best treated by tamponade with vinegar-soaked cotton.

As the pelvis becomes blocked with cancer masses, obstruction of the bowel may occur. It is then the surgeon's duty to perform colostomy.

In treating these unfortunate women it is the physician's duty to prolong life as long as possible and to relieve pain. To wittingly allow the patient to die sooner than she would were she stimulated and nourished is committing a sin by omission. To purposely shorten her life by the administration of overwhelming doses of morphine or by the performance of surgical operations which must inevitably result in death is criminal. The physician did not give the life, nor has he the right to passively or actively shorten it. *He* cannot be the judge in such matters, nor has he authority in law or morals for any act which will shorten life. I am constrained to approach the ethical phase of this subject, because certain teachers are pleased to advise shortening the life of the sufferer.

The author devised, and has in a number of instances practised, the application of ligatures to the vessels which nourish the

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<sup>1</sup> I employ that made according to the formula of Dr. C. G. Am Ende, and give one capsule twice a day.



malignant growth. The observation had for many years been made by the older surgeons, and more recently emphasized by Dawbarn, that the malignant growths shrink after the nutrient vessels are ligatured. In sarcoma this is particularly noticeable, large growths entirely disappearing. In epithelioma and carcinoma the changes are not so noticeable, but are sufficiently marked to arrest our attention. THEREFORE, IN EVERY YOUNG WOMAN WITH CANCER SO FAR ADVANCED AS TO PRECLUDE THE POSSIBILITY OF A RADICAL OPERATION, I ALWAYS LIGATE THROUGH THE MEDIAN ABDOMINAL INCISION, THE OVARIAN, THE INTERNAL ILIAC, AND OBTURATOR ARTERIES.

No attempt is made to remove any tissue, and only enough incision is made into the peritonæum to enable the operator to reach the vessels. After completion of this operation the cancer masses are scraped away through the vagina, and every facility offered for the freest escape of the necrosing tissue. The patient is put upon thyroid extract and tonics. By this treatment life is much prolonged and suffering diminished.

## CHAPTER XIX

### *HERNIA*

BECAUSE the pelvic floor in women is so elastic under an increase in the intra-abdominal pressure, those hernias which are common in men are infrequent in them. Women are particularly prone to umbilical and ventral hernias, the latter due to weakness in the scar of a laparotomy wound. We meet with ventral, umbilical, femoral, and inguinal hernias in women, and in frequency in the order mentioned.

**Median Ventral Hernia.**—There is a greater or less separation between the rectus muscles and their fasciæ in the line of the incision. It is probable that at first this diastasis is very slight. In the beginning but a small portion of the omentum bores its way between the musculo-fascial edges, and upon escaping becomes œdematous and enlarged through constriction at the hernial ring. Thus greater tension is produced outside the ring than exists within, and more omentum is drawn out. As the ring enlarges the small intestine enters the sac.

The hernial sac is composed of skin, fat, and peritonæum, or the fat layer may be entirely wanting, the viscera lying directly underneath the skin, so that intestinal peristalsis may be seen through the skin. Occasionally a patient will be met who has an enormous hernia, most of the intestines lying outside the abdominal cavity. Pressure ulcers in the skin over the protrusion may be present. As a rule the omentum and intestines are more or less adherent to the edges of the ring and sac. There is little tendency in ventral hernia to become strangulated, for, after once forming, the ring very soon assumes proportions sufficient to preclude strangulation. Ventral hernias should be closed as soon as found. While small, little difficulty is experienced in doing this, and the results are uniformly good; but after a large mass of intestines has for some time been outside the abdominal cavity it can be returned with

difficulty, and is retained against the continuous contraction of abdominal muscles which are unused to its presence. In other words, in old cases of ventral hernia of large size the abdominal cavity is actually smaller than normal.

In order to successfully close a ventral hernia it is necessary to secure the most perfect union between the muscles and fascia upon the separation between which the hernia depends. The operator should not cut directly down upon the hernial sac lest he wound an adherent knuckle of gut. The first incision should be curved and should be just over one edge of the ring. The incision proceeds down through normal anatomical layers: the skin, fat, external lamella of the rectus fascia, the rectus, the internal lamella of its fascia, and the peritonæum. If the sac is first entered the peritonæum is at once opened, and then the surgeon must cut through one side of the hernial ring in order to expose the fascial planes and muscle. It is safer to enter the abdominal cavity as described through normal anatomical structures so as to be in a position to inspect and deal with any existing complications from the visceral side. After all adhesions have been severed, the viscera are returned to the abdomen, and protected by a gauze pad placed over them and under the hernial ring. The redundant portions of the sac and skin are cut away, and the wound now appears as an ordinary laparotomy wound. There is this difference, however, that in the operation for the radical cure of ventral hernia there are two fascial planes to be united. If one only is seen the operation has been improperly done, because the operator has failed to cut away the scar-like tissue which lies over the muscles and fascia and which, covered as it is by peritonæum, very much resembles the *linea alba*. The peritonæum should be closed by a fine continuous tendon suture. The lower lamella of the rectus fascia and the rectus are brought together by one set of interrupted sutures of fine chromic tendon, the outer fascial lamella by another, and the skin and fat separately closed. If there is much tension in the line of union it may be relieved by sutures of silver wire which pass through all the anatomical layers and the ends of which emerge an inch outside the line of union. These sutures are not twisted, but are fastened by split shot.

As many of these hernias are due to suppuration in the laparotomy wound, much scar tissue may be met with about the edges of the hernial ring. This should all be cut away and healthy

muscle and fascia exposed. If the patient is very fat and the intra-abdominal pressure great, the outer lamella of fascia may be brought together with No. 27 silver wire, which is twisted 4 times, laid flat and cut short. These sutures are practically permanent, but only occasionally will they produce pricking sensations in after years. This method of suturing is particularly indicated in patients who have a chronic cough, and in case there has been much loss of muscle and fascia through sloughing. It is contra-indicated in very thin women. But in them the outer lamella of fascia may be brought together by the same suture that closes the skin and fat, and can then be of silver wire, which may be removed a month or so later.

In certain cases, after he has made his dissection, the operator will find that he cannot bring the edges of the muscle and fascia together. He will then proceed as follows: the peritonæum is closed by a running suture and the internal lamella of fascia approximated if possible, but if not it is ignored. The operator then dissects the fat up from the upper lamella of fascia for an inch upon each side by blunt dissection. He now cuts through the fascia upon each side in lines parallel with the abdominal wound. This will allow the rectus to slide inward and the outer lamella of fascia to be approximated across the wound. The rest of the wound is then treated in the usual way.

When the patient is very stout the procedure devised by me many years ago may be adopted. After closing the peritonæum and inner lamella of fascia with tendon sutures, I bring the muscle and outer lamella together with interrupted silver-wire sutures which are twisted and left long sticking up in the wound. No attempt is made to close the fat and skin, but they are kept apart by iodoform-gauze dressings. The silver-wire sutures are removed in three weeks. If found embedded in new cells the wires are untwisted and their loops thus exposed are cut, rather than the loops sought directly by digging for them. A wound so treated closes in about eight weeks by the formation of a mass of histological connective tissue through which no hernia can place. The wound does not granulate, merely fills in. The procedure takes advantage of the law that, under normal the offspring of every tissue resembles the parent. The close wound spring from the connective-tissue plane connective tissue.



It is advisable to keep herniotomy cases in bed until all risk of stretching the reunited structures is passed. I insist upon not less than four weeks in bed. Thus it is seen that many different techniques are required in dealing with the various forms of this distressing sequela of laparotomy.

**Umbilical Hernia.**—This is not, as is usually taught, a hernia through the umbilical ring. The mass of connective tissue which closes this opening is so firm that it cannot stretch. In adults the hernia comes out to one side of the ring. Occasionally we find congenital umbilical hernias of small size in the coloured children of the South which come through the umbilical ring. I have never seen one in a white adult. As a rule umbilical hernias are small, but may be so large as to contain the stomach. As the hernia forms through normal structures and not through a wound line, its ring is small and strangulation particularly liable. These hernias are most often seen in obese women. In them fatty heart and bronchitis are common. Therefore, operations upon them are accompanied by a mortality not seen in other herniotomies. The same principles govern the operation for the relief of umbilical hernia as ventral hernia. It is necessary to dissect out the umbilicus and the surrounding fascia until the rectus is exposed upon each side with its two fascial lamellæ. The linea alba is broader at the umbilicus than below, and hence there is more tissue to dissect away before exposing the recti.

When called to a case of strangulated umbilical hernia no attempt should be made to effect a radical cure. The operator cautiously opens the sac at its lower border and incises the ring in the middle line. The viscera are then carefully freed from the several pockets in which they lie in the main sac, and are returned to the abdomen. The skin is then closed and a large, firm dressing applied tightly enough to retain the viscera within the abdomen. This may be found impossible, and then the operator merely incises the ring to relieve the strangulation and closes the skin with silver wire. This can all be done under cocaine anæsthesia. The radical operation can follow in a few days after all symptoms of strangulation have disappeared.

**Femoral Hernia.**—The intestine or omentum escapes beneath Poupart's ligament usually internal to the femoral vein. So complicated is the anatomy when viewed from in front that I al-

ways perform a low median abdominal section in dealing with this condition. This is particularly insisted upon when strangulation exists or the hernia is incarcerated, one of which conditions exists in over half the cases coming to us for relief. After the abdomen is opened the viscera are drawn out of the sac and any complications dealt with. All the vessels about the ring are readily seen. The closure of the sac is now a simple matter and is effected by 3 chromic-tendon sutures. Care must be exercised not to wound the external iliac vein. The sutures pass through the lower border of Poupart's ligament, which they unite to the pubic fasciculus of the fascia lata.

If the surgeon prefers to operate directly upon the hernia, without opening the abdomen, he makes an incision over the hernia and enters the sac. The intestine is then returned and the sac freed, ligated, and cut away. A few sutures suffice to unite Gimbernat's ligament to the pubic fascia lata. The skin may be left open and packed with gauze, the opening closed by a connective-tissue hyperplasia, or else the skin may be sutured. I prefer the former method, as it gives a firmer scar.

**Inguinal Hernia.**—The operation for this, as a rule, is exceedingly simple. An incision is made over the sac and parallel with Poupart's ligament. Upon exposing the sac, this is lifted up and freed from the round ligament. The sac is then liberated from its contents and a stout tendon ligature is passed around its neck and tied once. The sac is now opened to make sure that it does not contain any omentum or other tissue, and the ligature around the sac is tied tightly. The sac is then cut away. In approaching the sac a few fibres of intercolumnar fascia may have to be severed, after which the section of tissues proceeds as described in the article on Alexander's operation. The round ligament is to be saved and is dissected up from its bed only sufficiently to permit the operator to raise it up above the aponeurosis of the external oblique. It is made to lie between this and the sac. The sutures should be of fine chromic tendon, and the serous and muscular layers are brought together by interrupted sutures. The skin is closed by a subcuticular suture of silver



### SUPRAPUBIC CYSTOTOMY

For several days preceding the operation the bladder should be frequently irrigated with borolyptol solution (1 to 32) or with an aqueous solution of metallic iodine (1 to 50,000). It is also advisable to give urotropin tablets for several days, to render the urine antiseptic. The operation is always an elective one except to control hæmorrhage from the bladder. It is particularly indicated in the removal of neoplasms and foreign bodies which are too large to be extracted through a vesico-vaginal incision or through the urethral speculum. A soft, self-retaining catheter is introduced and left open just before the operation.

The patient should be in Trendelenburg's position. The suprapubic transverse curved incision is made. Upon entering the prevesical space the loose tissue behind the pubis is separated by the fingers until the bladder is exposed. This is caught up by tenacula and a transverse incision made into its walls about midway between the peritonæum and the pubis. Care must be exercised not to wound the peritonæum. No urine from the probably infected bladder should be allowed to escape into the prevesical space. After the indicated intravesical operation has been performed the bladder wound is closed by fine chromic-tendon interrupted sutures, which sutures do not pass through the mucous membrane. If the operator is convinced he has performed a technically clean operation he may close the abdominal wound; but if the contents of the infected bladder have escaped through the vesical incision, the prevesical space should be drained by an iodoform-gauze wick introduced at its centre. In the after-treatment the bladder is kept empty by means of the self-retaining catheter, and is washed out once a day with borolyptol (1 to 32). In a week's time this catheter can be removed and the patient catheterized for some time by the nurse. The wound is usually tightly closed in two weeks.

### INFRAPUBIC CYSTOTOMY

This is employed for the purpose of draining the bladder in aggravated cases of cystitis, but chiefly to remove foreign bodies from the bladder. So large an incision can be made that stones of great size may be crushed and removed. This incision is there-

fore almost always indicated in vesical calculus, while the suprapubic operation is used for removing neoplasms of large size.

The preparatory treatment is the same as for the suprapubic operation. The patient should be in the lithotomy position, lying upon her back with abdomen and thighs flexed upon the buttocks at the table's edge. A curved male sound is introduced into the bladder while an assistant draws down the perinæum with a short Jackson speculum. The sound is made to push the anterior wall of the bladder downward, and this protrusion is incised exactly in the middle line. After the bladder has been entered the sound is pushed into the vagina and is not removed until the operator has enlarged the opening into the bladder sufficiently to receive his finger. The finger is pressed against the tip of the sound and held there, following the sound into the bladder as the latter is withdrawn. In this manner the sound acts as a guide into the bladder, the flaccid walls of which, even when incised, fold about the examining finger. A thorough examination is now made of the interior of the bladder, and if the incision already made is not long enough, it is enlarged by carefully incising its anterior and posterior margins. Any incision into the vesico-vaginal wall must be made accurately in the median line. In this way wounding either ureter is avoided. The anterior limit of the incision should stop short of the inter-ureteral fold, and the posterior at the point of attachment of the bladder to the uterus. After such operation as is indicated has been completed within the bladder cavity the incision is to be closed in the same manner as if a vesico-vaginal fistula existed, except when the incision is made for drainage only, in which instance, of course, the wound is left open. If the wound is closed, a self-retaining catheter is introduced and the bladder washed out. The bladder is irrigated through this catheter for ten days, when the silver-wire sutures are removed. After that, for a week longer, the bladder is to be emptied by catheter every four hours.

### OPERATIONS DURING PREGNANCY

Unless labour is expected within two months, all lesions of the vagina which might cause sepsis after delivery should be corrected. Therefore, the plastic operations for recto-vesico-vaginal fistulas and for complete laceration of



næum should be done. But as a general proposition it may be stated that it is advisable to postpone plastic operations until after the puerperal month. Abscess of the vulvo-vaginal gland likewise always demands removal.

**Adherent Retroposition.**—This jeopardizes the life of the fœtus. If a uterus fixed in retroposition becomes impregnated the uterus will empty itself as soon as it has risen by enlargement to the limit of its bonds. Replacement under general narcosis, the patient being in the author's position, should be tried, and if it be found that the organ cannot be lifted up out of the pelvis, posterior vaginal section is indicated so that the adhesions may be broken up. The vaginal incision is to be closed. The uterus should then be replaced and maintained in a high position for some weeks. Laparotomy in such a case is not indicated because the operator can do no more than sever the adhesions and dare not perform ventrosuspension, and because hernia through the abdominal scar is likely to follow the operation, as the enlarging uterus forces apart the abdominal parietes.

**Ovarian Cyst.**—With this complication the risk is the mother's. The cyst should be removed by laparotomy at the seventh month of gestation, if it be possible to wait that long, because then the abdominal muscles are stretched before the section is made and hernia is less likely. If there be evidences of interference with the circulation of the cyst, due either to torsion of its pedicle or because it is impacted low down in the pelvis, strangulation may be expected and the cyst must at once be removed, in the first instance by laparotomy, in the latter by vaginal section. Removal of an ovarian cyst, if done by a skilled surgeon, in no way jeopardizes the life of the fœtus or of the mother.

**Fibroid Tumours.**—Both lives are in jeopardy in certain forms. If the fibroid is pedunculate it may be jammed against the pelvic or abdominal wall by the larger and heavier uterus and a flexure in its pedicle be made so acute as to cause gangrene in the tumour, but, as a rule, fibroids about the body of the uterus do not interfere with pregnancy. The same is true of interstitial growths. But intraligamentous and retro-peritoneal growths complicating pregnancy make an association of conditions of the gravest import. Nothing can be done in the case of pregnancy with intraligamentary fibro-myoma except to wait until the child is viable and then perform Cæsarean section and extirpate the uterus.

When the fibroid is retro-peritoneal it blocks the pelvic outlet, and delivery is usually impossible except by Cæsarean section. Instead of waiting for the pregnancy to advance to term and then performing the elective Cæsarean section, I have opened the posterior *cul-de-sac* and removed the obstructing fibroids without interfering with the pregnancy, the patient going to full term.<sup>1</sup>

No operation is to be considered unless due regard is had for the rights of the unborn child. Neither life must be sacrificed in hope of saving the other unless death of one is inevitable. Fortunately modern gynæcological science is in perfect accord with ethical rules in such matters. IN OPERATING UPON ALL LESIONS COMPLICATING PREGNANCY THE RULE IS, TO INFLICT AS LITTLE TRAUMA UPON THE UTERINE MUSCLE AS POSSIBLE, PARTICULARLY OVER THE PLACENTAL SITE AND ABOUT THE CERVIX. The technique employed to remove the various tumours varies but little from that described elsewhere. If the growth is to be removed by laparotomy the abdominal cavity must be entered high enough above the pubis to escape the bladder, which is always drawn up in advanced pregnancy. If the pregnancy coexists with a sloughing intramural fibroid, or if the patient be septic at the time of operation and the sepsis has extended to the uterine muscle, total extirpation of the uterus is indicated.

**Cancer of the Uterus.**—Women with cancer of the body of the uterus are always sterile, and fortunately most of those who have cancer of the cervix are also sterile. But cancer of the cervix in its beginning, before manifesting itself clinically, is no bar to conception. After pregnancy occurs the cancer progresses with frightful rapidity. The question then arises, Shall the fœtus be ignored in the interests of the mother in these early cases, and a radical operation be performed? To allow the pregnancy to proceed to term dooms the mother either to a Cæsarean section and ultimate death from cancer or to death from puerperal sepsis due to infection by the cancerous cervix. My own practice is to treat all cases of early cancer in the pregnant uterus as though pregnancy were not present, but in advanced and hopeless cases to let the woman go to term and deliver by Cæsarean.

An assistant should cleanse by curette and cautery the vaginal field before the Cæsarean section is performed. After

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<sup>1</sup> H. W. Crouse, The Am. Jour. Obstet., September,

and placenta are delivered the uterus should be packed with iodoform gauze, one end of which projects through the cervix into the vagina, and the uterine wound closed over this. The abdomen is then closed.

**Pus Foci.**—Suppuration, whether of the adnexa uteri or vermiform appendix, should be treated as though pregnancy did not exist. Pregnancy associated with pyosalpinx is exceedingly rare, most cases of pelvic suppuration being sterile or aborting early.

It is important to pay particular attention to the kidney function in pregnant cases, for in them the pregnancy puts an additional strain upon the kidneys. The specific gravity of the urine and the urea percentage must be lowered by hydrotherapy before any operation is performed.

## RESULTS OF CASTRATION

It would be unnecessary to give a description of the local and general results of castration were it not for the absurd, often brutal, always unkind, statements made by ignorant women and practitioners to those who contemplate undergoing, or have submitted to operations which necessitate the loss of both ovaries. But in order that the student may be fortified against ignorance, I will give the results of our observations upon this subject. We may consider the results of the radical operation as affecting the locality operated upon and as influencing the body at large.

The most notable result of bilateral oophorectomy is amenorrhœa. This is not invariable, but menstruation often persists after both ovaries have been removed. It is still more likely to disappear if the tubes have at the same time been taken away. The younger the woman is, particularly if she has never borne children, the greater the probability of amenorrhœa appearing.

It is not positively known why castration sometimes fails to produce cessation of menstruation. It is probable that minute portions of ovarian tissue have been left in most cases.

Certain symptoms of the menopause appear, as well as obscure nervous phenomena, and the younger the subject the more pronounced they are. The most prominent are those which relate to disturbances in the vaso-motor system. The patient has at times attacks of chilly sensations, at others the surface of the body becomes suffused under the influence of a "hot flash." During



these the woman experiences a sense of great embarrassment. Many women suffer from a curious lack of mental balance; they are easily "rattled," lose their self-control readily, are unable to apply themselves to their duties, and are prone to become introspective. In others a pathetic melancholia sets in, while a few become actually insane. The nearer the patient is to the normal menopause, particularly if she has children, the less prominent are these symptoms. In young women, the knowledge that they are not like other women, that they cannot bear children if married, causes bitter disappointment. All of these symptoms can be much increased by mistaken sympathy, or lessened by the patient assuming routine duties and leading an outdoor life. I have observed that the wives of working men, to whom life is real and whose duties are ever present, have, as one woman told me, not "time to think about such things." If the uterus and tubes are removed and the ovaries left, these disturbances are less than when the ovaries alone are sacrificed. Other reasons will later be given for conserving the ovaries whenever this be possible. On an average, the symptoms of artificial menopause cease within a year and a half. To show the rarity of insanity following castration, the author has never seen such a result; and only one patient became insane after operation, and in her conservatism of cystic ovaries was employed.

Certain local changes occur after castration. The nymphæ shrink, become glazed and inelastic, the vulva as a whole flattens, and the vulval hair thins. The introitus vaginae becomes rigid and inelastic. Upon opening the vagina, it will appear of a pinkish hue, and its epithelial covering can easily be rubbed off. The external genitals have assumed senile appearances. The cervix uteri will be found shrunken and the vault of the vagina drawn in around the cervix. In advanced cases the corpus uteri is found much diminished in size. The rigidity of the vulval structures often renders coition painful. All of these changes are most marked when the operation has been done in nulliparous and young women.

The subject of loss of sexual appetite is one often brought by patients or their husbands. When a woman had the sexual desire cultivated she is not apt to acquire double ovariectomy. If she has fully learned what it is not lose it after operation. In many cases where dis



tions have made of the woman a sexual pervert or nymphomaniac, she becomes normal after operation. Occasionally castration, by centering a woman's attention upon her special organs, will increase the sexual desires. Lastly, when coition is painful, due to disease, it becomes pleasurable after a cure is effected.

Certain disturbances in metabolism are produced by castration. As a rule the tendency to take on weight is notable. The acquisition of flesh is general, and unlike the obesity which so often sets in at the normal menopause. Women who have lost their ovaries maintain a youthful appearance longer than those who have not, and the smooth, unwrinkled skin is often a notable feature even when the hair is very gray. In a few instances, I have seen enormous enlargement of the breasts occur.

The classical experiments of Curatulo and Tarulli indicate the profound nature of these tissue changes. They found that the elimination of the nitrogen bears the same relation to the body weight as before operation, but that there was a marked diminution in the elimination of phosphates. This effect of the ovarian function is still more noticeable in cases of osteomalacia in which the elimination of phosphates is increased. The results of ovariectomy in these is to reduce the amount of phosphates eliminated very markedly. Removal of the ovaries also increases the elimination of calcium. The fact is forced upon us that the ovaries secrete a substance which powerfully affects metabolism. This has been substantiated by the benefits derived from feeding mammary-gland extract to women who present the symptoms of a disagreeable nature during the artificial menopause.

I have found that alcoholic beverages increase all the subjective symptoms of the surgical menopause. One of the most remarkable results of double ovariectomy is the apparent increase in the liability to cancer which it causes.

There is little influence upon the voice produced by ovariectomy. I have performed ablation three times upon noted singers, and they all state that their voices have improved since the operation.

## CHAPTER XX

### *HÆMOSTASIS*

BLEEDING during gynæcological operations, or when due to diseases peculiar to women, may be controlled by pressure, by torsion, by drugs, by electro-hæmostasis, by heat, and by ligation.

**Pressure.**—If the vessel which has been severed is small it may be grasped by artery forceps, which are left on for ten minutes while the operation proceeds. Upon removing the forceps, it will generally be found that the bleeding has ceased. This method of stopping hæmorrhage—temporary forcipressure—is applicable to all vessels of the sixth degree in size and those of lesser calibre. Vessels larger than this are better controlled by some other method. This temporary forcipressure is particularly applicable to the vessels severed in median laparotomy and in perinæorrhaphy. As little tissue about the vessel as possible should be included in the grasp of the forceps. For this purpose no forceps is superior to one having the points of the American bulldog or the Langenbeck pattern.

The application of pressure in gynæcology has its chief scope in the control of parenchymatous hæmorrhage. If this occurs from the separation of recent lymph effusions during a laparotomy, the bleeding is best controlled by the application of strips of mild iodoform gauze. A pressure of not over two ounces in degree will suffice to stop such bleeding, and the gauze packing is particularly effective if the bleeding surface is caught between the gauze and the bony pelvis, an impossible thing, however, when the hæmorrhage comes from an intestinal wall. It is advisable to keep the bleeding surface exposed for some minutes to the light and air before applying the gauze packing, as both have an influence in causing coagulation of blood. In fact, surfaces which very often bleed actively when first separated and which seem to demand a pressure-drain to control them, will, upon

being exposed to the light and air for a few minutes, become entirely dry.

During a perinæorrhaphy a spouting vessel may be held under a piece of iodoform gauze by thumb pressure while the operator proceeds with his work, and will often after a few minutes be found to have closed.

Control of bleeding by pressure is particularly applicable when it occurs from the uterus. If the cervix is sufficiently open the uterine cavity may be packed with iodoform gauze in the same manner as is described under curettage. This is particularly true when the bleeding is due to the presence of fibromyomata. Over such a packing a vaginal tamponade of the same material should be placed. Both will need removal in three days.

If the cervix is closed and the bleeding of sufficient quantity to weaken the patient, the uterus should be washed out through a Fritsch catheter with two quarts of Thiersch solution to prevent putrefaction in the after-forming clot. The cervix should then be sewed up with silver wire. This can be done without narcosis and with but little pain. In three days these sutures must be removed, during which time the patient can be subjected to treatment to overcome the effects of the previous hæmorrhage and to prevent its recurrence. The statement is often made that this damming up of blood within the uterus will conduce to the formation of hæmatosalpinx and pelvic hæmatocele. There is found, but only occasionally, a condition of retention of blood under even greater pressure than is seen in any fibro-myomatous case, when the hymen is impervious and no menstrual blood escapes. Although the blood is fluid in these cases, there has been no observation made of its flowing back through the Fallopian tubes. The contention is entirely academic and not borne out by experience.

It is next to impossible to pack the vagina with a force sufficient to control a uterine hæmorrhage without at the same time interfering with the functions of the bladder and rectum. We have all seen cessation of flow follow vaginal tamponade, but it was probable that the occurrence was merely coincident.

Bleeding from cervical growths or ulcerations, which are directly under the control of cleansing methods, is amenable to forms of treatment not applicable to the interior of the uterus. Carcinomatous and other ulcerations in this situation may be

subjected to pressure by styptic cotton, by alum-soaked cotton, by gauze wet in adrenalin solution, and even to the application of the actual cautery.

**Torsion.**—Mediate torsion is not employed in gynæcology, those vessels which might be so treated being preferably subjected to occlusion by ligature. Direct torsion is a valuable means of closing vessels of the sixth and lesser degrees. The cut end of the vessel is grasped in the artery forceps and the forceps is turned until the progressive fracture of the arterial coats releases the instrument. The vascular walls ruptured in this manner retract within the lumen of the vessel and effect a speedy and sufficient occlusion. The method is particularly valuable in perinæorrhaphy, in which operation it is desirable to avoid as much as possible the introduction of ligature material between the edges of the wound.

**By Drugs.**—Menorrhagia is somewhat lessened by the internal administration of tincture of cannabis indica in doses of gtt. xv. q. 4 h. This drug also tends to lessen the bleeding from fibromyomata. By far the most powerful influence exercised by any drug upon bleeding vessels is by adrenalin. This was first suggested to me by Dr. Gordon, of Montana. It should be employed in a 1-to-2,000 solution. A long hypodermic needle is plunged directly into the uterine muscle through the cervical tissue, or into any presenting part of a tumour, and a few minims of the drug are injected. The tissues at once become blanched. Even in performing hemisection of the highly vascular uterus during either abdominal or vaginal hysterectomy, the walls of the uterus alongside the proposed line of incision may be rendered bloodless by injections of this drug. I have not as yet employed it to control the bleeding from the cancerous cervix, but believe it will be particularly useful to clear the field of operation for the actual cautery in such cases.

The internal administration of large quantities of gelatin for some weeks seems to shorten the time of coagulation of the blood, and therefore has an indirect hæmostatic effect. It aid in the preparation of an exsanguinated fibroid case future operation.

All drugs which slow the heart's action and constrict the arterioles lessen the amount of blood which will escape from the bleeding surface; and the vaso-motor dilators have the opposite



**Heat.**—Parenchymatous oozing, as from the separated lymph planes during a laparotomy, may be checked by the momentary application of a sponge dipped in water of about 150° F. But this degree of heat also coagulates plasma cells and must therefore not be employed against raw surfaces which it is intended to unite by suture, such as those made in perinæorrhaphy, as it would interfere with union. Bleeding from a cancerous cervix may be checked by the application of the actual cautery. Beyond this, ordinary heat is of little value as a hæmostatic in gynæcology.

**Electro-hæmostasis** (Skene's method, Fig. 142).—Next to the control of severed vessels by ligatures this is the most valuable

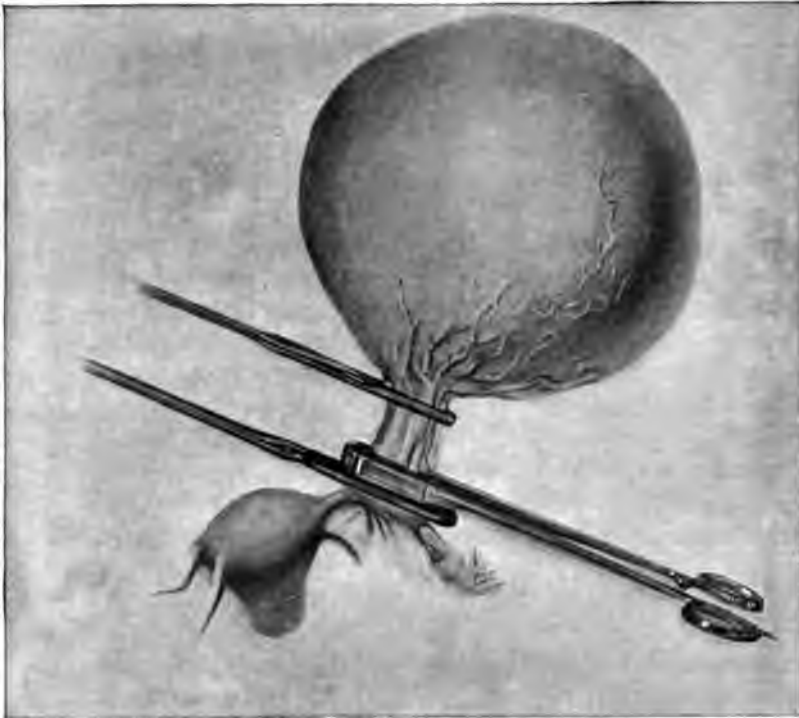


FIG. 142.—TREATMENT OF PEDICLE OF OVARIAN CYST. (Diagrammatic.)

means at our disposal for preventing bleeding. It has a utility little appreciated by surgeons. It is singularly applicable to the control of large vessels in the pedicles of pedunculate fibro-myomata and ovarian tumours.

The tumour is withdrawn from the abdomen or through the vaginal incision and its pedicle grasped with the clamp (Fig. 142), which is closed tightly enough to control its vessels, and the tumour cut away. Beneath the clamp either a non-conducting shield or sufficient wet gauze pads are introduced to prevent burning the tissues beneath the clamp. It is well to grease the blades of the clamp with sterilized vaseline before applying it in order to prevent its sticking to the tissues after the clamp has been used. At first the forceps is closed to the first catch, then the current is turned on for from a half to one minute. The forceps is then clamped down hard and the current left on for a total of three minutes. The forceps is then removed and the stump will be found to be a thin, corrugated, translucent, and homogeneous structure in which neither vessels nor other tissue can be recognised. The time during which the current is on will depend upon the thickness of the pedicle. When the tissues adjacent to the pedicle bubble and turn gray the process is nearly complete, and is complete when the bubbling ceases. The tissues must not be burned. The degree of heat to be developed is about 192° F. The vessels become agglutinated and the individual component parts of the stump are lost in the dehydrated pedicle. An absolutely sterile pedicle is produced and ligatures are unnecessary. The reader is referred to Dr. Skene's book for elaboration of the details of this most valuable addition to our technique. It has been used by me in the treatment of ovarian pedicles, ectopic sacs, and chronic salpingitis, through the vagina. I have never seen a secondary bleeding occur after it.

**Angeiotripsy.**—This is the application of a crushing force to the vessels by means of a powerful forceps, some of which are capable of effecting a pressure of 3,000 pounds. The forceps is left on each stump for two minutes and then removed. The pedicle will be found thinned and exsanguinated. Secondary hæmorrhage occurs with disagreeable frequency after the use of this instrument, and some of its early advocates now merely employ it to thin out the pedicle before applying ligat method of hæmostasis never became very popular a nately less so than at first.

**Ligation.**—*In Continuity.*—Obliteration of the vessel is accompanied most often by the formation of not infrequently no clot forms and the vessel clo

between the internal coats, which are held in apposition by the ligature. At one time it was thought necessary to apply sufficient force in tying the vessel to rupture the intima and perhaps break the inner portion of the media. But the classical experi-



FIG. 143.—CHROMIC CATGUT LIGATURE AFTER THREE DAYS' APPLICATION AROUND THE CAROTID ( $\times 60$ ).

The intestinal villi of this gut are well seen. This mucous tissue in the ligature material is objectionable in that it renders sterilization difficult and weakens the ligature. The fissure allows of the too early penetration of the corpuscles. (Ballance and Edmunds.)

ments of Prof. John A. Wyeth have shown that all that is needed is to secure a close apposition between the inner walls of the vessel. Deligated vessels do not always remain closed, but the blood-current may become established either wholly or partially after the lapse of some months or years. The obliteration of a vascu-

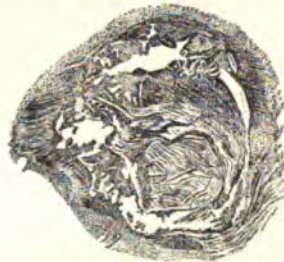


FIG. 144.—CHROMIC CATGUT AFTER FOURTEEN DAYS' APPLICATION AROUND THE CAROTID ( $\times 30$ ).

Suppuration occurred and the catgut is being rapidly broken down, cells being everywhere in its structure.

lar trunk is more surely permanent if it be severed between two ligatures, for not only will the closure be effected by union between the intima walls, but also by the formation of scar tissue at the cut ends of the vessel. If sufficient force be employed in tying the ligature to rupture any of the coats of the vessel it is



weakened by just that much, and secondary hæmorrhage is more likely in case infection occurs.



FIG. 145.—ORDINARY SILK AFTER FORTY-TWO DAYS AROUND THE CAROTID ( $\times 90$ ). The drawing shows the structure of the silk and the invasion of the upper portion by leucocytes. (Ballance and Edmunds.)

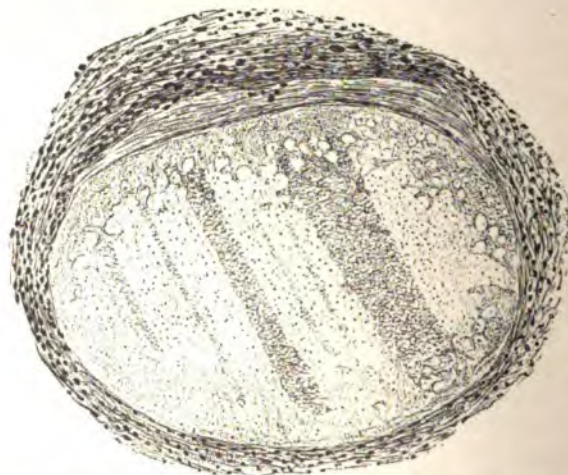


FIG. 146.—SILKWORM GUT AFTER TWENTY-ONE DAYS AROUND THE CAROTID ( $\times 200$ ). Corpuscles have collected but have not penetrated. The striations in the ligature were produced by the section knife. (Ballance and Edmunds.)

The force, then, MUST BE JUST SUFFICIENT TO APPROXIMATE THE INTIMA. Therefore an inelastic ligature material must be



used, for a contracting ligature continues to close down after the knot is tied.

Obliteration by union begins within a few hours after the vessel is tied, but it takes some days for the occlusion to become firm. Therefore the ligature must maintain its position and shape for not less than a week, and it is advisable that in tying large vessels like the iliacs, a ligature be used which will hold for two weeks or over. To do this the ligature must not stretch as it softens in the fluids of the tissues, and it should be of so homogeneous a structure that leucocytes can with difficulty penetrate into it. This element of homogeneity is additionally valuable in case infection occurs, for the denser and more homogeneous the structure of the ligature the more difficult is it to infect it. It is, however, desirable to have the ligature disappear at some time, otherwise it will act as a foreign body. The requirements of a perfect ligature material are met by chromic kangaroo tendon.

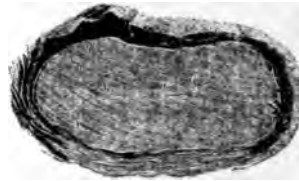


FIG. 147.—KANGAROO TENDON AFTER TWENTY-ONE DAYS AROUND THE CAROTID ( $\times 20$ ).

A mass of corpuscles is seen covering the ligature, but the invasion is upon the surface only. (Balance and Edmunds.)

	Homogeneity.	Elasticity.	Susceptibility to infection.	Sterilization.	Absorbability.
Catgut, chromic.	Many different layers of tissue.	Marked.	Very great.	Most difficult.	Irregular and unreliable.
Kangaroo tendon, chromic.	Absolute.	None.	Very slight.	Easy.	Constant and uniform.
Silk.	None.	Slight.	Very great.	Easy.	After a great many years.
Silkworm gut.	Absolute.	None.	Very slight.	Easy.	None.
Silver wire.	Absolute.	None.	None.	Easy.	None.

The *knot* which must be employed is of great importance. The one most easily tied is the reef knot (Fig. 148). But one twist, not two, of the ends should be taken in forming the first part of the knot, and the second should be made without lifting the vessel. It is impossible to prevent a very slight slipping in the first knot as the second is tied; and this slipping is increased

if the first knot be made by two turns and if the second knot is made while making traction on the ends. As the first knot is made it should be held for a few moments so that the tissues

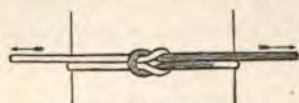


FIG. 148.—THE REEF KNOT.

may lose some of their elasticity. The second knot is then quickly but gently made. I generally put in a third knot. An absolute preventive against slipping is the "stay knot" (Fig.

149). With this two ligatures are used side by side and the first knot in each is made separately. The ends of both are then used to make the second knot. The degree of force necessary to secure an occlusion of the vessel should be accurately determined by practice with a scales. This is important when the subject of ligating such vessels as the internal iliacs, or the uterines in massive fibromata, is contemplated. Two pounds' pressure will close the iliac, six pounds will produce a superficial rupture, while eight pounds will rupture two coats of the vessel. In using two ligatures to form the stay knot, a method necessary with the

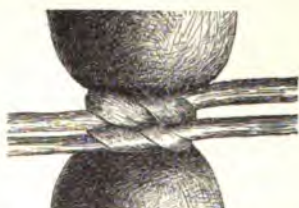


FIG. 149.—THE FIRST PART OF THE STAY KNOT.



FIG. 150.—THE FINISHED STAY KNOT.

largest vessels only, the index fingers are under great strain if a force of ten pounds is applied in tying the knot.

The uterine artery has a very dense outer coat, it being as thick as the media, and thicker than the externa of the internal iliac. Therefore a comparatively greater force is needed to occlude it, and it will easily stand a pressure of three pounds without danger. It is interesting to know that the uterine artery in the virgin is larger than in the woman at term.

*En masse.*—The ligature is thrown around all the tissue about the vessels and no attempt is made to isolate them. As a result there is much shrinkage of the soft parts within the grasp of the loop and the ligature becomes loose, inviting hæmorrhage. This

danger the operator guards against by employing a force which makes his ligature crush the tissues down about the vessel. Mass ligatures are admissible only when applied to soft pedicles like the ovarian or the round ligament whose artery is small. But the uterine artery should never be secured in this manner.

**Hæmostasis by Forceps.**—This method of causing obliteration of vessels is employed in laparotomy only when removing the uterus, ovaries, and tubes for virulent streptococcus puerperal infection.

In such cases time is a most important element, and inasmuch as an abdominal drain of iodoform gauze must be used on account of the retroperitoneal lymphatic infection, the slough produced by the forceps will be taken care of by the drain. In such cases the forceps are indicated, because there is no known ligature which will not become infected. But once in his experience has the author been compelled to perform such an operation, fortunately with success, and the indication must be exceedingly rare.

It is in the performance of vaginal hysterectomy that this method of controlling the vessels finds its chief application. The forceps are, as has been described in the article upon this operation, left on for forty-eight hours, when they are removed. The result of the forcipressure is to produce slough in all the tissues which have been subjected to it. This slough is cast off in the second or third week, long after the vessels have become completely obliterated. The sloughs putrefy and their formation is accompanied by a very disagreeable odour, which, however, is not detected if the wound is dressed every three days. Inasmuch as the sloughs are strictly extraperitoneal, the stumps being in the vagina, no infection results from their formation. It is in pus cases that this method of operating is chiefly indicated, for it renders the operation speedy and safe, and avoids the application of ligatures in a pus field, which are so apt to become infected and produce future mischief. In removing fibroid uteri between forceps, after the operation is completed, if it is desirable to do so, ligatures can be substituted for the forceps. At no point in the convalescence should the operator pull upon the sloughs to dislodge them if they are tightly fastened, because doing so may produce bleeding.

## CHAPTER XXI

### ANOMALIES

**General.**—Total absence of all the organs of generation, both internal and external, is unknown, careful examination having shown rudimentary traces in all suspected cases.

A more common association of abnormalities is the blending of the male and female types, producing hermaphroditism. These may be classified as—

1. Bilateral, where the ovaries and testicles exist upon both sides, and of which there is no known case.

2. Unilateral, where an ovary and testicle exists upon one side, the existence of which is denied by many.

3. Lateral, where an ovary and testicle are present upon opposite sides.

The nearest approach to true bilateral hermaphroditism known was the noted case of Rokitansky upon which an autopsy was held. There two ovaries, two tubes, rudimentary uterus, and one testicle with a *vas deferens* containing spermatozoa were found. There was externally an imperforate penis and bifid scrotum.

The tendency of most cases is towards the male type. There is generally a rudimentary penis, often interpreted as a hypertrophied clitoris. There is complete hypospadias, the scrotum being bifid. One or both testicles may not have descended. As a rule there is more or less hair on the face, the shoulders are square, the mammae absent, and the voice like that of a boy. These pseudo-hermaphrodites are not uncommon.

**Treatment.**—These radical errors in development are interesting to the scientist rather than to the practical surgeon. They very rarely call for operative treatment. Most pseudo-hermaphrodites are men reared and dressed as women. Some even marry as women, as did a case under my charge. In such an instance there can be little reason for deepening by operation the perineo-scrotal fissure merely for purposes of copulation, as most subjects



use the urethra or rectum for that purpose. Nor should the penis be amputated. The true indication for treatment is found

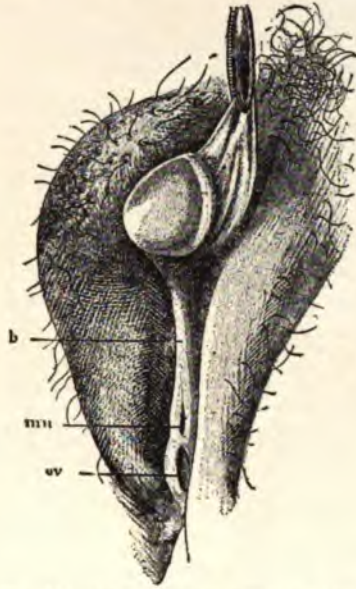


FIG. 151.—PSEUDO-HERMAPHRODISM PROPER.

External genitals of Jolie D—(man); *b*, frænum; *mu*, meatus; *ov*, vulvar orifice. The case is one of perineo-scrotal hypospadias. (Pozzi.)

in the necessity for releasing the penis, and by plastic work correcting the hypospadias.

### SPECIAL

*Vulva*.—The clitoris, nymphæ, and labia may be absent. The labia and nymphæ may be multiplied. Enormous hypertrophy of either one or all these structures may exist. The clitoris may be bifid, constituting epispadias; or the posterior wall of the urethra may be lacking, forming a hypospadias.

*Hymen*.—The hymen may be imperforate, the condition being usually acquired, rarely congenital. The hymen may have multiple openings or be entirely absent. It is subject to great variations in form and shape.

*Vagina*.—The vagina may be congenitally absent, in which case the uterus also is absent; or it may become obliterated in

early life. *Atresia* of the vagina is not very uncommon, a fibromuscular cord closing the canal at some point. When menstruation begins, the blood is retained, constituting a hæmatocolpos. If the occlusion is near the vulva it can readily be overcome; but if situated high up and the lower part of the tube is obliterated careful dissection is needed to correct the deformity. Whenever such an accumulation is evacuated the canal should be kept

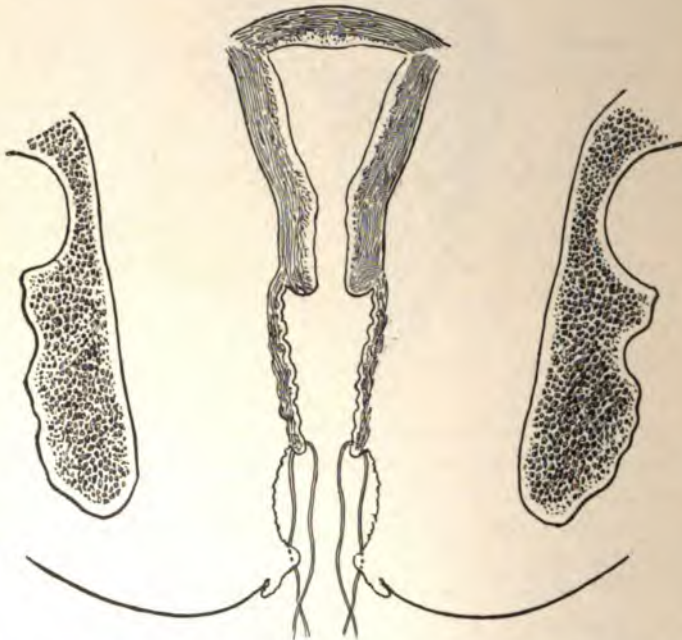


FIG. 152.—OLD ATRESIA OF THE VAGINA OPENED AND EVACUATED; INTERRUPTED SUTURES IN PLACE TO DRAW THE VAGINAL MUCOSA DOWN TO THE MUCOSA AT THE VAGINAL OUTLET, BRIDGING OVER THE DENUDED AREA IN THE CONNECTIVE TISSUE.

scrupulously clean, and any new channel which has been made is to be kept open by Sims's glass plug while healing is going on.

The general scheme of suturing, when this is possible, is in the illustration.

*Double Vagina.*—This may be either complete through entire length of the tube, or for only a portion, a ridge extending down the middle of the vagina dividing it into two lateral canals. The condition is frequently found to coexist with

uterus. The sæptum can be safely incised and with little bleeding, the anterior and posterior raw surfaces being separately closed



FIG. 153.—DOUBLE VAGINA WITH A THICK FLESHY SÆPTUM. THE LEFT ORIFICE IS OVAL, WHILE THE RIGHT IS CRESCENTIC.

by running sutures and kept apart by iodoform dressing to prevent their reuniting.

*The Uterus.*—The lower portions of the ducts of Müller become fused into a single canal about the tenth week of foetal life, and the upper portion of this canal becomes the uterus, while



FIG. 154.—UTERUS SÆPTUS. (Gravel.)

its lower portion forms the vagina. Errors in this fusion will produce various malformations of the uterus.



The uterine cavity may be divided by a sæptum coming down from the fundus, but the cervix be single, forming a *uterus sæptus*.

When the fundus is bifid and the cervix single, the case is one of *uterus bicornis*.



FIG. 155.—BICORN UTERUS WITH SINGLE NECK. (Kussmaul.)

If the division be complete, there being two separate organs, it is a case of *uterus didelphys* (Fig. 156).

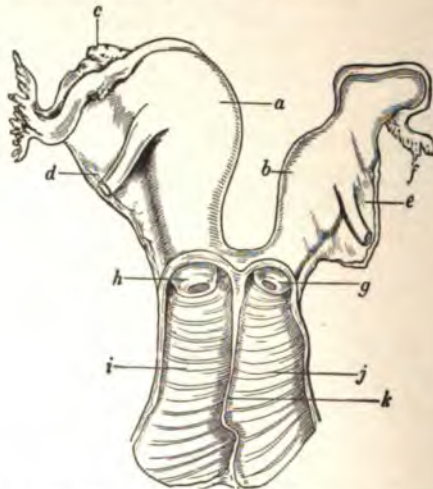


FIG. 156.—DIDELPHIC UTERUS AND DIVIDED VAGINA.  
*a*, right segment; *b*, left segment; *c*, *d*, right ovary and round ligament and round ligament; *k*, vaginal sæptum; *h*, *i*, right cervix and vagina. (Oliver.)

The uterus may be rudimentary, there being mer-  
 cord to represent it, or may retain an infantile form  
*uterus fatalis*.



*Treatment.*—Anomalies of the uterus call for no treatment. Their types should be borne in mind as presenting complications during gynæcological operations. The author once was compelled to curette one horn of a uterus sæptus after it had aborted, another physician having failed to discover its presence while removing a dead fœtus from the other horn. Conception in one-half of a uterus sæptus will arouse a suspicion of interstitial ectopic pregnancy, and it is probable that many of the cases reported as interstitial pregnancies were in reality conceptions in a uterus sæptus.

The several anomalies of the uterus produce no symptoms which call for operation, and are interesting from an obstetrical standpoint chiefly.

## CHAPTER XXII

### *INSTRUMENTS*

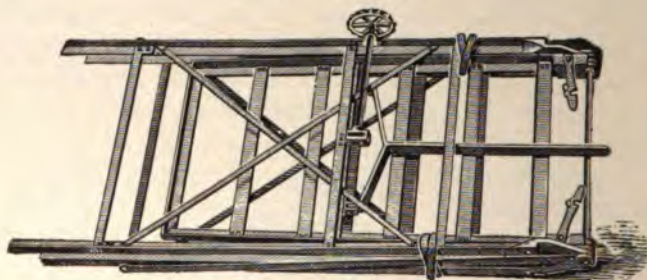


FIG. 157.—THE OPERATING TABLE FOLDED FOR SHIPMENT.



FIG. 158.—THE OPERATING TABLE SET UP AND IN  
TRENDELENBURG'S POSITION.



FIG. 159.

THE AUTHOR'S HYSTERECTOMY CLAMPS WITH DETACHABLE HANDLES.



FIG. 160.

30, Sims's speculum; 31 and 32, Jackson's retractors; 33, Péan's lateral retractor; 34, Pryor's lateral retractor; 35, Pryor's grooved retractor; 36, Pryor's rectal tube; 37, laminaria tent; 38, Péan's anterior retractor; 39, Fritsch-Bozeman double irrigating tubes; 40, Sims's glass plug; 41, Pryor-Péan trowel; 42, urethral speculum; 43, Pryor's pessary; 44, Mundé's curette; 45, Sims's curette.



FIG. 161.

2a, silver-wire suture; 73, needle threaded with carrier thread. The loop is left open to show its formation. Before using, the knot is drawn taut below the eye of the needle; 60, knives for morcellation; 61, author's bistoury; 62, blunt bistoury; 63, dressing forceps; 64, bivalve speculum; 65, the author's and Sims's dilators; 66, uterine probe; 67, tampon screw; 68, applicator for packing the uterus; 69, 70, 71, needle-holders; 72, wire-twister; 74, vesico-vaginal scissors; 75, 76, 77, 78, various styles of scissors.





FIG. 162.

79, the author's uterine repositor; 81, Sims's fibroid hook; 82, diverging tenaculum; 83, Hunter's sponge-holder; 84, Luer's polypus forceps; 84, cautery knife; 85, dome-shaped and probe cauteries; 86, gauze roll for keeping uterus up after author's operation for retroversion; 87, fibroid screw; 88, 91, 92, 94, F'ean's traction forceps; 93, author's 3-pronged traction forceps; 95, grooved director; 89, Nélaton's forceps; 90, author's intra-uterine traction forceps.



FIG. 103.

50-57, the author's cystoscopes with obturators and secondary tubes; 58, Kelly's cystoscope; 59, window obturator to close cystoscope for forcible atmospheric dilatation of the bladder; 60, 61, 62, 63, 64, 65, the author's clamps; 66, author's short temporary clamp; 67-69, various styles of artery forceps; 70, Skene's electro-clamp; 71, 72, the author's ureteral probes; 73, Kelly's ureteral searcher; 74, forceps for removing foreign bodies from bladder; 75, ureteral dilator; 76, flexible ureteral catheter; 77, Pawlin's ureteral catheter; 78, self-retaining vesical catheter; 79, tenaculum with diverging blades; bottle of kangaroo tendon.

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